NEW DEGREE PROGRAM PROPOSAL

ASSOCIATE OF APPLIED SCIENCE (AAS) DEGREE
IN
MOBILE APPLICATION DEVELOPMENT

Information and Computing Studies Department
National Technical Institute for the Deaf
Rochester Institute of Technology

May 7, 2015, Version 18

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Glossary of Acronyms

(AAS) Associate of Applied Science

(BS) Bachelor of Science Degree

(COLA) College of Liberal Arts

(COS) College of Science

(DAS) NTID's Department of Access Services

(d/hh) deaf and hard-of-hearing

(GCCIS) B. Thomas Golisano College of Computing and Information Sciences

(HLC) Hugh L. Carey

(ICS) Information and Computing Studies

(IST) Information Sciences and Technologies

(LBJ) Lyndon Baines Johnson

(NTID) The National Technical Institute for the Deaf

(NYS) New York State

(RIT) Rochester Institute of Technology

1. Program Description and Purpose

A. Program Description

1. **Overview**
   The Mobile Application Development program is an associate degree program that prepares students for work in the software development industry with a focus on application design and development for mobile platforms. Mobile app development is a field that brings concepts in programming, web development and interface design together. Using current and emerging technologies, students will develop skills in app design, learn relevant programming languages for application development on a variety of smart-devices and learn the policies and procedures for submitting apps for distribution.

   The program is designed with 77 total credits of which 49 are technical credits, 24 are liberal arts and science credits, three credits for a free elective and one for *Freshman Seminar*. Courses cover multiple aspects of Internet and mobile-related technologies, including programming languages and web markup, server-side technologies and tools, mobile web development, responsive design and application optimization for mobile devices. Although the degree is designed and intended to be a career-focused terminal degree, students can continue their education by applying to transfer into the Information Technology baccalaureate degree program with a concentration in platform-specific mobile app development.

2. **On-the-Job Responsibilities**
   Graduates of this program may work independently or with a team of programmers writing and developing software programs for mobile applications for contemporary devices. This requires skills in information gathering, user-centered design, effective deployment practices on a range of devices and strong communication skills.

3. **Places of Employment**
   The majority of the graduates of this program will find jobs in public or private software development companies. Most often, these companies will specialize in web or mobile application development.

4. **Prerequisites**
   ACT: Students with an ACT composite score of 17 or higher, with minimum scores of 18 in Mathematics, 16 in English, and 19 in Reading will be considered for direct admission to the program.

   English: Placement in a First Year Writing course such as FYW: Writing Seminar (UWRT-150). Students that place into UWRT-100, Critical Reading and Writing would also be considered.

   Mathematics: Placement into NTID Mathematics (NMTH-250) or higher. Typically, students entering this major will have completed at least three years of high school mathematics.

   Science: Typically, students entering this major will have completed at least two years of high school science.

B. *Educational and Career Outcomes*

1. Educational Outcomes as recommended by the RIT Student Learning Outcomes Assessment Office:

Program Goals & Associated Student Learning Outcomes
1. Create effective software solutions
   - Students will be able to analyze real world problems and efficiently code solutions.
2. Create effective and user-friendly mobile interfaces
   - Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
3. Publish applications across multiple platforms
   - Students will be able to create, secure, test and maintain mobile applications for two or more platforms
4. Utilize effective professional communication and collaboration skills.
   - Students will be able to demonstrate effective verbal and written communication skills.
   - Students will be able to work effectively as a member of a team.
5. Indicate overall satisfaction with the program and courses.
   - Graduating students will synthesize educational experience to determine level of satisfaction

2. Career Outcomes

Career Education:
The proposed program is designed to offer students a new degree option for an attractive career in mobile application development. The skills attained will prepare students for entry-level employment as application developers, web/mobile designers and/or developers, and computer programmers. It will also prepare them for opportunities to continue their education for a baccalaureate degree should they so choose. The curriculum will be responsive to technological advances and will prepare students to meet the demands in a continually evolving workplace.

Critical Thinking and Analytical Skills:
Computer programming, which requires significant analytical skill development, is central to this AAS degree. In addition, students will enhance their abilities in reading, writing, visual communication, critical thinking, problem solving, science and mathematics. Students will have multiple opportunities in a variety of contexts to gather, process, organize and present information in technical and liberal arts courses. Because of this constantly evolving computing field, this program will provide a basis for a lifetime of intellectual inquiry.

Excellence:
The field of mobile computing and more specifically mobile application development is still emerging and cutting edge. The importance of maintaining currency in mobile technologies will remain the driving force for faculty training and teaching excellence.

NTID students will be preparing for a career in a field where no NTID Associate degree program currently leads. Also, mobile app development students will take general education coursework in other colleges of RIT, thus adding to the diversity of student experiences in those classes. Students will demonstrate their abilities to

establish quality study skills as well as high standards of analytical and ethical conduct.

Community and Personal Growth:
Courses offer opportunities for self-discovery, personal and social responsibility, and enhancement of interpersonal skills as well as promoting career awareness. Liberal studies in global, social, artistic and ethical focus areas as well as extensive technical education promote community and personal growth. As members of the NTID and broader RIT communities, students will have opportunities to expand their intellectual, social and cultural experiences with deaf/hard-of-hearing and hearing students.

A learning support community established for students with activities both in and out-of-class will allow for increased peer support and additional faculty and student interaction, which is expected to enhance retention and increase graduation rates.

Lifelong Learning:
Because of the constantly evolving nature of mobile computing and smart devices, this program will promote the inclination and habit of intellectual inquiry conducive to a lifetime of learning.

C. *How the program fits with the institution's mission, vision, values and reputation.*

The Mobile Application Development program is consistent with the missions of the university and the college by focusing on an emerging area to which graduates will be able to contribute their creative products and faculty/staff will be able to pursue new directions of scholarship.

From the RIT and NTID Mission Statements:

> *"RIT's mission is to provide a broad range of career-oriented educational programs with the goal of producing innovative, creative graduates who are well-prepared for their chosen careers in a global society.*
>
> *We rigorously pursue new and emerging career areas. We develop and deliver curricula and advance scholarship and research relevant to emerging technologies and social conditions."*
>
> *NTID's primary mission is "to provide deaf and hard-of-hearing students with outstanding state-of-the-art technical and professional education programs, complemented by a strong arts and sciences curriculum that prepares them to live and work in the mainstream of a rapidly changing global community and enhance their lifelong learning."*

The Mobile Application Development program will be a new and innovative addition to the NTID education portfolio that will allow students to earn an associates' degree in the new and rapidly growing field of mobile computing. Faculty will work collaboratively with industry partners to develop stimulating projects and foster experiential learning through capstone and co-op. The students will be well-prepared to meet the challenges of working in this growing field or to continue their education in other colleges within RIT.

1. **Innovative and well-prepared:**
    This is the first (and only) mobile application development program currently offered in New York State using a platform-agnostic (cross-platform) approach to teaching mobile application development. This innovative approach will open job opportunities for our students unavailable to native platform developers. Additionally, according to the NYS Inventory of Registered Programs, there are only three other associate degree level mobile app development programs offered in NYS, and two of them are offered in a distance learning only format.[1]

    Taking advantage of the eleven in-class technical courses dedicated specifically to mobile app development, much of the instruction in this program will be interactive and will include the use of new and emerging mobile smart devices, making students well-prepared to meet the demands of industry.

2. **Creative, collaborative and experiential:**
    The industry partnerships we have developed will offer the opportunity to create and implement real-world solutions to industry problems in capstone and co-op. This collaborative and experiential learning environment will provide students with a real-life learning environment to better prepare them for the workplace of the 21st century.

    The nature of this emerging, career-oriented Mobile Application Development program will require creativity from students in designing mobile applications. These apps will be designed and applied to state-of-the-art smart devices and wearable technologies.

    A learning support community established for each new year of students will allow faculty and students to work together on both in and out-of-class activities and promote peer support.

3. **Synergistic and interdisciplinary:**
    The NTID program is interdisciplinary, integrating the mobile application development technical courses with a business course (World of Business and Innovation) and a workplace related course (The World of Work) to provide students with a broader educational experience.

    The program provides for lifelong learning opportunities through a synergistic balance of technical credits and arts and science credits preparing students to work in a changing global community.

D. *Describe the justification and need for this program and how this program contributes to RIT's strategic plan priorities and key result areas*

Due to the explosive growth in the use of mobile devices to access and use the Internet, there's been a boom in the field of mobile application (app) development. In 2012, deployment and use of mobile applications created a $53 billion economy and by 2016, it is expected to rise to $143 billion.[2] Additionally, by 2016, the global app economy is expected to account for 33% of the combined app services and handset market (up from 18% in 2012) which is an indication that the number of apps will continue to grow and outpace the value of handsets on a yearly basis.[3]

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[1] http://www.nysed.gov/heds/IRPSL1.html
[2] Godfrey , Jonathan and Reed III, Morgan. "App Store after Five Years." ACT: The App Association, 19 July 2013
[3] Christina Voskoglou. "App Economy Forecasts. 2013-2016" DE: Developer Economics. 17 July 2013.

Smart phones, smart things, tablets and wearable devices will continue to change the way we communicate, do business and access news & entertainment. With that, the demand for new and innovative mobile apps is growing and will continue to grow. *The* increased demand *"translates to one of the largest IT skills gaps ever realized – there are simply more mobile app development job openings than skilled application developers to fill them."* [4]

"ITCareerFinder, an on-line portal for helping IT professionals advance their careers, assembled a comparison of the decade's hottest technology careers. These careers will experience the fastest growth through 2020, pay salaries well above the national average, boast top employment, and offer a range of advancement opportunities." [4]

According to ITCareerFinder, the Mobile Application Developer position was highlighted as being the best computer career for the future. The Bureau of Labor Statistics predicts that the number of Computer Software Programmer jobs will grow by 28% (much faster than average) from 2010 to 2020 and that mobile app developers will have approximately 82,000 jobs for associate degree holders during that period. [5]

According to an article published by the Online Learning Consortium, "Mobile Apps are the fastest growing dimension of the mobile space in higher education right now, with impacts on virtually every aspect of informal life, and increasingly, every discipline in the university." [6]

From the RIT Strategic Plan:

> *"Our mission is to provide technology-based tracks for personal and professional development. We rigorously pursue new and emerging career areas. We develop and deliver curricula and advanced scholarship relevant to emerging technologies and social conditions."*

This program responds to employment opportunities in the new and emerging career area of mobile computing. Working with industry partners, students and faculty can engage in scholarship opportunities.

1. **Student Success**
   Student success will be realized by:
   - a) students and faculty engagement through a learning support community.
   - b) student, faculty and industry collaboration in the capstone course.
   - c) student and faculty interaction in scholarship opportunities.
   - d) real-world experience with industry partners offered through co-op.
   - e) increased job opportunities because of cross-platform app development experience.

2. **Innovation, Creativity, Research and Scholarship**
   The nature of this emerging, career-oriented Mobile Application Development program will require creativity from students in designing mobile applications. These

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[4] Greenspan, Daniel. "IT Career Paths." IT Career Finder, July 2014.

[5] Bureau of Labor Statistics. Occupational Outlook Handbook. < http://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm> Retrieved 1 Oct 2014.

[6] http://onlinelearningconsortium.org/institute/asynchronous-workshop/2014/10/24/introduction-mobile-apps-and-tablets

apps will be designed and applied to state-of-the-art smart devices and wearable technologies. Mobile devices are rapidly becoming universal as they are being adopted by many currently excluded groups who have never used computing devices before, including senior, disabled or illiterate individuals. To be successful, mobile application developers need to learn and incorporate universal design (assessable design) principles. NTID researchers in the Center of Access Technology are in the forefront of accessible design and access technologies as applied to deaf, hard of hearing and low vision. The combination of research expertise and consumer needs as it applies to universal/accessible design will result in many research and scholarship opportunities for faculty and deaf and hard-of-hearing students.

3. **Organizational/Operational Excellence**
The program will be assessed by both RIT's comprehensive assessment review as well as by a diverse group of industry advisors providing continual feedback on areas where the program can be improved.

4. **Stakeholder satisfaction**
There will be several opportunities to assess stakeholder satisfaction. They are:
   a) Students in the Mobile Application Development program will be assessed annually in terms of their satisfaction with the program and the department.
   b) Students will be assessed by their employers at the end of the required co-op in the summer between their fourth and fifth semester.
   c) Employer-partners from whom we get mobile app development projects will assess satisfaction with the student work at the end of the capstone course.

The results of the surveys will be reviewed annually by both the ICS department and Mobile App Development industry partners.

E. *Describe curricular features that:*

1. **Facilitate and support student and faculty scholarship, research and creativity**
The curriculum offers faculty and students opportunities for scholarship of discovery leading to the design and development of unique and creative apps. Apps designed for universal access in particular, will provide significant research and scholarship opportunities.

2. **Address emerging disciplines**
Mobile app development is an emerging discipline in the field of mobile computing. Students will be introduced to and will work with state-of-the-art mobile and wearable technologies to produce applications.

F. *Description and list of documented curricular interconnections and integration between this program and other disciplines, programs and colleges at the University*

The following courses are being taken outside of the Mobile Application Development program.

NACT-240 The World of Work: Students will take this course from the Career-Focused Applied Computer Technology program in the ICS department to prepare for the challenges of the workplace.

NBUS-211 World of Business and Innovation: Students will be encouraged to pursue entrepreneurial endeavors and as such, take a course offered by the NTID Business Studies department the focusing business studies including the topic of entrepreneurism.

NACA-172 Website Development: Students will take this course from the AS-BS degree program in ICS designed for transfer to the GCCIS IT program.

All liberal arts, science and Math courses: These courses provide a strong foundation for learning and for living and working in an increasingly diverse community and workplace.

Technical Electives: Eligible technical electives are shown in Table 1a with approvals noted in respective internal Letters of Support (**Appendix C**). Students can take a technical elective from the NACA or NACT programs in ICS, those wishing to continue their education for a baccalaureate degree will be encouraged to take their technical elective course in GCCIS's IST department (specifically the IT program) to allow for maximum credit transfer.

G. *Role of faculty in the program's design*

The proposed AAS in Mobile Application Development program was proposed and designed by the chairperson and the Mobile Application Development curriculum team in the NTID Information and Computing Studies Department. Several faculty members provided expertise in developing and reviewing proposed courses. Faculty from the entire department reviewed the full program proposal along with the new courses and provided feedback. Additionally, several faculty members from the GCCIS Information Sciences and Technologies (IST) and Interactive Games and Media (IGM) department reviewed the proposed coursework and provided feedback.

H. *Input by external partners*

A Curriculum Advisory Board was assembled to review the proposed Mobile App Development program. This board was comprised of nine representatives from the mobile computing Industry, three individuals from RIT BS level programs with strong knowledge of mobile app development, two from an out-of-state community college with a degree program in mobile app development and an NTID employment advisor.

The curriculum advisory board members who reviewed the Mobile Application Development program course mask and course descriptions are shown below. Qualifications can be found in **Appendix D**.

Name	Title	Organization
Craig Lamb	Partner and CIO	Envative
David Mastrella	Partner and Chief Architect	Envative
Todd Bernhard	CEO	No Tie Software
Steve Maier	Senior Technical Evangelist	Microsoft
Ian Caspersson	President	IC9 Design
Mark Navarra	Recruiting Manager	Wellington Steele and Associates
R. John Gaudu	VP and Founding Partner	Wellington Steele and Associates
Paul Solt	CEO	Artwork Evolution
Jesse Black	Software Consultant	Self-Employed
Dr. Larry Ray	Program Chair	Stark State College, Canton,

		Ohio
Sharon Hoover	Instructor	Stark State College, Canton, Ohio
Bryan French	Lecturer	GCCIS/RIT
Dan Bogaard	Associate Professor	GCCIS/RIT
Anthony Jefferson	Senior Lecturer	GCCIS/RIT
Regina Kiperman-Kiselgof	Senior Employment Advisor	NTID/RIT

After reviewing our program and curriculum plans with them, the advisory board provided input that was generally very positive and helpful. It is summarized in **Appendix D**. We were able to use their input to make program improvements that are reflected in the program mask, course descriptions and course outlines. Additionally, several members of the advisory board were eager to offer continued assistance in an advisory role, assist in faculty training, work with the students on capstone projects, consider hiring prospective graduates and even possibly provide some hardware and software. (See External Letters of Support in **Appendix D**)

I. *Enrollment projections for Year 1 through Year 5*

For two years, the ICS department in NTID has been offering a special topics course called "Windows Phone App Development". Each time the course has been offered, we have achieved maximum class enrollment. Most of the students taking the course are either currently or formerly in one of ICS' associate degree programs.

In the spring of 2014, the ICS department conducted a one-question clipboard survey for all students in the ICS department to gauge student interest in a program focusing on mobile app development. The question posed was, "If a program that teaches how to create apps on mobile devices (smartphones, tablets, etc.) were offered when you came to NTID, would you have considered applying to this program?" The results were profound. Of 51 respondents, 45 answered "Yes".

Based on the app development course we offered, the student survey we conducted, program awareness opportunities through the NTID dual credit program (where students can take a pre-approved course in high school that awards both high school and college credit), and the natural affinity young people have for mobile devices, we anticipate this will be a popular program. Resource constraints however will require us to limit enrollment to 12 new students per year, with new students accepted only in fall semesters. Students accepted into this program will be screened to meet the enrollment criteria of this associate degree. The screening includes, but is not limited to math and English placement testing once they arrive at RIT, evaluation of transfer credits from other post-secondary institutions, and honors, AP or dual credits from high school.

Detailed Mobile Application Development enrollment projections, market analysis, and graduation rate projections that were reviewed and approved by Dr. Jim Miller, Senior VP of Enrollment Management and Career Services at RIT can be seen in **Appendix B**. The abbreviated table below shows the projected enrollment for five years and reflects an anticipated 80% retention through year one (Fall, Year 1 to Fall, Year 2) and 72% retention through year 2, (Fall, Year 2 to Fall, Year 3). At the end of fall semester, Year 3, nine students will have graduated from the program, taking the total number of students in the spring semester, Year 3 down to 22 from 31 in the fall semester.

Enrollment	Year 1 AY16-17	Year 2 AY17-18	Year 3 AY18-19	Year 4 AY19-20	Year 5 AY20-21
Enrollment Fall Semester	12	22	31	31	31
Enrollment Spring Semester	12	22	22	22	22
Total Semesters of Enrollment	24	44	53	53	53

2. Program Courses and Schedule

The proposed Mobile Application Development program offers a comprehensive curriculum designed with 77 total credits of which 49 are technical credits, 24 are liberal arts and science credits, three credits for a free elective and one for *Freshman Seminar*. The 77 credits hours will be taken over five semesters with one co-op experience between the fourth and fifth semester.

A. *Required and elective courses in the program*

AAS Credit Summary

- Total of 77 credits, 24 courses, projected over five academic semesters
- Technical Component = 49 credits / 15 courses (which includes one 3-credit Technical Elective)
- Liberal Arts and Sciences Components = 24 credits / 8 courses
- Other courses = 3 credits /1 course Free Elective; 1 credit *Freshman Seminar* Wellness Education = 0 credit
- Co-op Work Experience between fourth and fifth semester

B. *Courses in Table 1a that satisfy RIT's General Education Framework*

The following general education courses are part of Table 1a.

1. **Foundation Courses**
   a. UWRT-150 FYW: Writing Seminar
   b. LAS Elective

2. **Perspectives for AAS Degree**
   a. LAS- Perspective 1 (Ethical)
   b. LAS- Perspective 2 (Artistic)
   c. LAS- Perspective 3 (Global)
   d. LAS- Perspective 4 (Social)
   e. LAS- Perspective 6 (Scientific Principles)

3. **Immersion – Not required for AAS degree**

4. **General Education Electives**
   a. NMTH-255 Introduction to Discrete Mathematics

5. Wellness Education

C. Technical Courses

The technical courses that make up the Mobile Application Development program fit into four basic categories; Fundamentals, Development, Design and Other.

FUNDAMENTALS
- Prog. Fund. Mobile I
- Prog. Fund. Mobile II
- Intro to Web Dev.
- Software Analysis & Design

DEVELOPMENT
- Mobile App Dev I
- Mobile App Dev II
- Web Services & Data Storage
- Best Practices for Mobile Development

OTHERS
- World of Business and Innovation
- World of Work
- Capstone
- Technical Electives

MOBILE APPLICATION DEVELOPMENT

DESIGN
- Mobile User Interfaces
- Mobile User Experience
- Mobile App Design Elements

Fundamentals: App programming (coding) is typically the most difficult area for students to master. For this reason we are utilizing increased contact hours with students in the Programming Fundamentals I and II courses where we will introduce the programming language *C#.* Past experiences have shown that learning programming alone is not sufficient to gain a solid understanding of programming and how objects communicate with each other. For that reason, we developed a course called Software Analysis and Design. This course will emphasize the importance of writing good and efficient app programs, not just programs that work. The Web course will introduce students to basic HTML code so they can develop a simple website on which they can present a portfolio of projects they have worked on.

Development: We will be going beyond the fundamentals of C# and introduce *Xamarin*, a cross platform framework with the goal of creating apps that work across multiple platforms. As Steve Maier of Microsoft says, *"I like your plans to use Xamarin and C# as the method of delivering the content to students." [The plan] "has been well thought out and fits well into the market today and in the future. More and more apps are moving in a cross-platform direction and introducing students to this in the degree will definitely benefit them."* The Mobile App Development I and II courses will focus more on the back-end of programming and emphasize more on the overall app experience where performance and battery life are critical issues to address. The Web Services and Data Storage course will focus more on aggregating data from various sources across the web and displaying them in a space-efficient manner.

Design: Users expect great experiences and naturally we believe that apps must perform well and be complemented with pleasing aesthetics. A basic understanding of the design principles and app design guidelines will be taught in the Mobile User Interfaces course. To gain a better understanding of the user experience as it relates to app use is critical, which is why we developed the Mobile User Experience course to emphasize the importance of usability studies and user feedback. Students will learn the front-end development in the Mobile App Design Elements course and understand the various controls, navigation patterns and other UI elements.

Others: Another important area in the curriculum labeled "Other" include the Capstone Projects course where students, mentored by Mobile App Development faculty, will work with an employer-partner to develop an app that the employer needs. The employer will determine the requirements of the app and students will work with them to achieve the goal of producing a publishable app.

In the World of Business and Innovation course, students are exposed to typical business organizations, learn organizational structure, and gain a basic understanding of entrepreneurship. The World of Work course will also focus on the workplace, preparing students for job search, preparing resumes and reinforcing workplace principles such as workplace ethics and other soft skills necessary for gainful employment.

Improved Retention and Student Success through a Learning Support Community
An important aspect of this program will involve the use of a learning support community involving both Mobile App Development students and faculty. With the anticipated academic demand of the Mobile Application Development program, the establishment of a learning support community will serve to foster student retention and student success. This learning support community will bring students and faculty together in various activities such as code competition, guest speakers, code hour, team building exercises as a means of building self-confidence and promoting greater progress in academics. Faculty will not be the center of this learning support community, but become an advocate or mentor on the sidelines to support students and the learning support community outside of the classroom. Students will form relationships with other peer students and inherently develop life skills. Additionally, there will be industry experts getting involved in offering support and advice to the learning support community.

Table 1a: AAS in Mobile Application Development

ASL-Deaf Cultural Studies*

Term: Fall Year 1 / Term: Spring Year 1

Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)
NCAR-100 Freshman Seminar	1				
LAS Elective*	3	X			
NACA-172 Website Development	3		X		
NMAD-180 Programming Fundamentals I: Mobile Domain	4		X	X	
LAS Artistic Perspective*	3	X			
Term credit total:	14	6	7		

Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)
UWRT-150 First Year Writing: Writing Seminar	3	X			
NMTH-255 Introduction to Discrete Mathematics	3	X		X	NMTH-212 or eq.; UWRT-100
NMAD-181 Programming Fundamentals II: Mobile Domain	4		X	X	NMAD-180
NMAD-182 Software Analysis and Design	3		X	X	NMAD-180
NMAD-150 Mobile User Interfaces	3		X	X	NACA-172
Term credit total:	16	6	10		

Term: Fall Year 2 / Term: Spring Year 2

Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)
NMAD-260 Mobile App Development I	4		X	X	NMAD-181; 182
NMAD-251 Mobile App Design Elements	3		X	X	NMAD-150
NMAD-250 Mobile User Experience	3		X	X	NMAD-150
NACT-240 The World of Work	3		X		
LAS Ethical Perspective*	3	X			
Term credit total:	16	3	13		

Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)
NMAD-261 Mobile App Development II	4		X	X	NMAD-260
NMAD-270 Best Practices for Mobile Development	3		X	X	NMAD-260
NMAD-262 Web Services and Data Storage Technologies	3		X	X	NMAD-260
LAS Scientific Principles Perspective	3	X			
LAS Social Perspective*	3	X			
Wellness Education	0				
Term credit total:	16	6	10		

Term: Summer Year 2 / Term:

Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)
NMAD-299 Mobile Application Development Co-op Work Experience	0		X	X	NACT -240 NMAD-261, 262, 270
Term credit total:	0	0	0		

N/A

Term: Fall Year 3 / Term:

Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)
NBUS-211 World of Business and Innovation	3		X		
Free Elective*	3				
Technical Elective**	3		X		
NMAD-290 Mobile Application Development Capstone Projects	3		X	X	NMAD-261; 262; 270
LAS Global Perspective*	3	X			
Term credit total:	15	3	9		

N/A

Program Totals:	Credits: 77	Liberal Arts & Sciences: 24	Major: 49	Elective & Other: 4

* An ASL-Deaf Cultural Studies (AASASLDCS) course is required for graduation. It can be taken in any semester and can be taken at NTID or another college of RIT. In order to fulfill this requirement as part of the 77 credits in the program, it can be a course approved for *both* AASASLDCS *and* an LAS Perspective or LAS Elective, or it can be used as the Free Elective.

** The Mobile Application Development program Technical Elective can be: Web Implementation (NACA-174), Programming Fundamentals II (NACA-161), Web and Mobile I (ISTE-140), Intro to Database and Data Modeling (ISTE-230), Java for Programmers (ISTE-200*),* or a course from another program with approval of the ICS Department Chair and the Department Chair of the program offering the course.

C. *See Appendix C for the following letters of support from other departments offering required courses*

1. **Elissa Olsen** – Department Chair, NTID Information and Computing Studies

2. **Mary Lou Basile** – Department Chair, NTID Business Studies

3. **Jennifer Gravitz** – Department Chair, NTID Liberal Studies

4. **Matthew Lynn** – Department Chair, NTID Science and Mathematics

5. **James Winebrake** – Dean, College of Liberal Arts

D. *Non-traditional schedule (e.g., off-campus, on-line, etc.)*

Not applicable. All of the courses will be offered on campus in classrooms or labs.

E. *Copy of the current catalog description for existing courses*

NCAR-100   **Freshman Seminar**
The course provides entering NTID students with opportunities to develop/enhance academic skills, personal awareness, and community involvement in order to maximize their college experience. Students have opportunities to explore and navigate the college environment, develop/reinforce academic skills and participate in service learning opportunities. Students are encouraged to establish meaningful connections with faculty, staff and peers. The course promotes the development of plans for ongoing growth and involvement in class and in the RIT/NTID and/or broader community.
Class 1, Lab 1, Credit 1 (F,S)

NACA-172   **Website Development**
This course introduces students to web page and small-scale website development. Through hands-on laboratory experiences, students will learn the fundamental concepts needed to construct web pages that follow appropriate coding standards as well as basic design principles to present content in an attractive and organized manner. Topics include HTML, CSS, graphical elements, website publishing, and transfer protocols.
Class 2, Lab 3, Credits 3 (F,S)

NACT-240   **The World of Work**
The goal of the course is to provide students with the business-related skills to acquire a cooperative or permanent job, and the personal and social skills to succeed on the job. Topics related to workplace communication and relationships, as well as financial management, employer expectations, and personal goal setting will also be covered. The course will also include the development of job search skills, resume writing and interviewing, along with skills in word processing, spreadsheets and presentation software as needed in the workplace.
Class 3, Credits 3 (F)

NBUS-211   **World of Business and Innovation**
This course is an overview of the functions and processes of business organizations. Topics include the roles and responsibilities of the manager, managing business ethics

and social responsibility, competing in a global environment, organizational structure and authority, and managing diversity, change, communication and innovation.
Class 3, Credits 3 (F,S)

UWRT-150   **First Year Writing - Writing Seminar**
First Year Writing is a three-credit seminar limited to 21 students per section. The course is designed to develop first-year students' proficiency in analytical writing, rhetorical reading, and critical thinking. Students will read, understand, and interpret a variety of texts representing different cultural perspectives and/or academic disciplines. Academic, non-fiction texts, chosen around a particular theme, are designed to challenge students intellectually and to stimulate their writing for a variety of contexts and purposes. Through inquiry-based assignment sequences, students will develop academic research and literacy practices that will be further strengthened throughout their academic careers. Particular attention will be given to the writing process, including an emphasis on teacher-student conferencing, self-assessment, class discussion, peer review, formal and informal writing, research, and revision; small class size promotes frequent student-instructor and student-student interaction. The course also emphasizes the principles of intellectual property and academic honesty for both current academic and future professional writing.
Class 3, Credit 3 (F, S, Su)

F. See Appendix A for new course outlines

3. Faculty

All of the NTID technical, mathematical and science courses are taught by NTID faculty who use direct instruction, including, but not limited to: sign language, spoken language, printed/visual aids, web-based instructional materials, and individual tutoring. The remainder of the courses in the AAS program will be taught by either NTID faculty who use direct instruction or by COLA faculty, depending on the courses and sections chosen to fulfill the liberal arts requirements.

Analysis shows a need for a total of 2.17 FTE to cover the ICS courses in this program. As shown in tables 2 and 4, one new FTE lecturer will be hired to cover two courses in the new program and six other ICS courses that are currently taught by the faculty who will be reassigned to teach the Mobile Application Development courses. The remaining 1.17 FTE will be covered by reassignments in faculty workload that have resulted in a capacity to offer more courses in the department. This additional capacity is primarily the result of two tenured faculty who had reduced teaching loads due to grant work now being assigned to full time grant work and having their teaching load covered by lecturers who can teach an additional number of courses beyond what the two tenured faculty were teaching.

There will be no impact on the course offerings for other ICS programs or the students' ability to graduate on time.

Table 2: Current Faculty, Full-Time

Faculty Member Name and Title/Rank at Institution (include and identify Program Director)	Program Courses which may be Taught	Percent of Teaching Time for Program Courses	Highest and Other Applicable Earned Degrees and Disciplines (include College/University)	Additional Qualifications: list related certifications/ licenses; professional experience in field, scholarly contributions, other academic affiliations.
Olsen, Elissa -Department Chair -Mobile Application Development Program Director -Assistant Professor	N/A	0%	M.S., Software Development and Management, Rochester Institute of Technology	21 years in Higher Education as Teacher and Administrator 13 years as Industry Programmer
Brian Trager -Assistant Professor	NMAD-181 Programming Fundamentals II: Mobile Domain NMAD-182 Software Analysis and Design NMAD-251 Mobile App Design Elements NMAD-261 Mobile App Development II	66.67% (4 courses)	M.S., Information Technology, Rochester Institute of Technology	11 years Teaching in Higher Ed Almost $200,000 in Funded Research as PI or Co-PI Extensive Publications, Conference Presentations, CAID, SIGSCE, RESNA, SITE member

Chris Campbell - Lecturer	NMAD-250 Mobile User Experience NMAD-260 Mobile App Develop I NMAD-270 Best Practices for Mobile Developers NMAD-262 Web Services and Data Storage Technologies	50% (4 courses)	M.S., Computer Information Systems, University of Phoenix	3 years Teaching in Higher Ed 12 years as Software Developer 3 years as Business Analyst
Raja Kushalnagar - Assistant Professor	NMAD-150 Mobile User Interfaces	25% (1 course)	Ph.D. Computer Science, University of Houston	5 year Teaching in Higher Ed 5 years Industry Experience Certified Information Systems Security Professional (CISSP) Received over $375,000 in Funded Research as PI or Co-PI Extensive Peer-Reviewed and Published Research ACM, IEEE, USENIX member
Karen Beiter - Assistant Professor	NACT-240 The World of Work NACA-172 Website Development	33.34% (2 courses)	M.S. Computer Science, Rochester Institute of Technology	21 years Teaching in Higher Ed 11 years as Computer Systems Analyst Research experience in Assistive Technology ACM/SIGSCE member
Joseph Stanislow -Assistant Professor	NMAD-180 Programming Fundamentals I: Mobile Domain	16.67% (1 course)	M.S. Computer Science Stevens Institute of Technology	13 years Teaching in Higher Ed. 20 years Industry Experience CompTIA A+ Certification Extensive Research, Publications and Conference Presentations ACM, ASEE, CAID member
TBD (Lecturer to be hired)	NMAD-290 Mobile Application Development Capstone Projects NCAR-100 Freshman Seminar	25% (2 courses)	Unknown until the lecturer is determined	Unknown until the lecturer is determined

Table 3: Current Faculty, Part-Time

Faculty Member Name and Title/Rank at Institution (include and identify Program Director)	Program Courses which may be Taught	Highest and Other Applicable Earned Degrees and Disciplines (include College/University)	Additional Qualifications: list related certifications/ licenses; professional experience in field, scholarly contributions, other academic affiliations.
N/A	N/A	N/A	N/A

Table 4: Faculty to be Hired, Full-Time

In year two, the current ICS faculty teaching courses for the Mobile Applications Development program will not be able to teach courses which they currently teach. A new lecturer will have to be hired. When the new lecturer is hired, he/she will teach eight courses (such two courses for the Mobile Applications Development program NMAD-290 and NCAR-100 identified in Table 2) plus six ICS courses, such as those identified below in Table 4.

Title/Rank of Position	# of New Positions	Minimum Qualifications (including degree and discipline area)	Expected course assignments	Expected Hiring Date (mm/dd/yy)
Lecturer	1	MS in Computer Science, Information Technology or related discipline	NACT-120 Introduction to Computer Applications NACT-151 Windows Operating Systems NACT-170 Introduction to Website Development NACT-230 Introduction to Programming NACT-235 Introduction to Database Applications NACT-240 The World of Work	08/22/2017

The NTID Department of Science and Mathematics will be teaching one mathematics course for this program to be offered once a year and the NTID Business Studies Department will teach one course from their program. As can be seen in the letters of support in **Appendix C**, both of these can be accomplished with current mathematics and business department faculty resources.   As we continue to refine the course offerings, where appropriate, we may solicit the expertise of other departments if their skill sets fit areas of needed expertise.

If needed, the ICS department maintains a list of adjunct faculty available for courses in our programs.

See **Appendix F** for the Curricula Vitae of faculty listed in Table 2.

4. Financial Resources and Instructional Facilities

A. Instructional facilities and equipment needed to ensure the success of the program

1. **Space**
   With the additional 12 students per year students and the addition of 14 new courses (including special topics, independent study, Mobile Application Development co-op) to the ICS portfolio of courses, lecture and lab space will be impacted. There is a pending move of the ICS department from the HLC building to the LBJ building. In the most recent design there is an (approximate) 450 sq. ft. lab designated for the Mobile Application Development lab. With two classrooms dedicated to the ICS department in the most recent design, there will be sufficient classroom space for the Mobile Application Development program (as well as current ICS programs).

   In a letter of support provided by Erwin Smith, Assistant Vice President for Information Technology and College Operations dated 10/24/2014, he writes: "*NTID is renovating nearly 9,000 sq. ft. in LBJ Hall to support the Information Computing Studies programs. Approximately 450 sq. ft. on the 1st floor of LBJ Hall will be allocated to the proposed Mobile Application Device (MAD) program. NTID is working with FMS and HBT Architects to finalize the design and construction schedule.*"   See Allocation for Space Request in **Appendix E.**

2. **Lab or studio space/equipment to be shared**
   Two labs, one to be used as a general ICS "Self-Instruction Lab" (in which students in all ICS programs can work on homework, get course tutoring, check electronic communications, etc.), and another, the "Multimedia Lab" will be shared with other ICS programs. Classroom space will also be shared with other ICS programs. See **Appendix C** for the letter of support from Elissa Olsen, Chairperson of ICS indicating approval for shared space.

3. **Equipment specific to the Mobile Application Development program**
   Because mobile devices become dated so quickly, we anticipate a need to annually replace a portion of the smart devices used for app development at an anticipated cost of approximately $2000/yr. These can be obtained through the NTID annual department equipment request, using department funds, grants, or may be obtained through industry partners/corporate donations.

4. **Computer facilities**
   The Mobile Application Development lab and the ICS general purpose classrooms will be equipped with appropriate computer facilities to accommodate the maximum class size of 12 students. The lab will be equipped with sufficient benches, electrical capacity, internet connections, and computers.

5. **Other space and equipment needs**
   There are no additional space needs.

   We project an approximate $2000 annual software cost for cross-platform development kits. The software can be obtained using department funds, grants, or may be obtained through industry partners/corporate donations. Other needed software is readily available without an extra cost.

B. *New program financial projections*

The NTID cost model analysis in **Appendix G** prepared by Mr. Steve Morse, Assistant Vice President for NTID Finance and Budget, includes four tables detailing projected expenditures and revenue over the first five years of the program. There are no anticipated capital expenditures. New Program costs for each year over a three-year period are shown below in Table 5. These costs include faculty/staff salary and benefits plus costs such as computers, instructional supplies, telephone, software licenses, travel/conferences, and tuition payment for RIT credits.

Table 5, New Resources is shown below. For more information on the new program cost model, see **Appendix G**.

Information and Computing Studies Department

Mobile Application Development Associate of Applied Science Degree Program

Projected Expenditures For The Proposed Program

Table 5 – New Resources

Additional Salary & Benefits for 1.0 FTE Lecturer. This hire is required by the home department to teach other department courses (unrelated to this new program) starting in year 2 (2017-2018) which previously would have been taught by faculty teaching in this new program.

New Expenditures	Year 1	Year 2	Year 3
Personnel		$80,000	$83,000
Library			
Equipment			
Laboratories			
Supplies & Expenses (Other Than Personal Service)*	$26,200	$39,200	$45,400
Capital Expenditures			
Other **	$104,600	$137,500	$155,400
Total all	$130,800	$256,700	$283,800

* The amounts in this row represent RIT computer charges for students/faculty/staff involved in the program, Instructional supplies, telephone charges, software licenses, and travel/conferences for faculty. A breakdown of these expenses may be found on Table 1 – Projected Expenditures for the Proposed Program.

** The amounts in this row represent tuition payments for RIT credits and overhead (RIT indirect costs). A breakdown of these expenses may be found on Table 1 – Projected Expenditures for the Proposed Program.

5. Library Resources

A. *Assessment of existing library resources by collection librarian*

NTID Education Librarian, Joan Naturale, stated that *"This program will have a minimal impact on the library's services and collection of books, journals, and databases."*

Please refer to a supporting letter from Joan Naturale in **Appendix C**.

B. *Institution's response to identified needs*

"The Wallace library's **Computer Science and Information Technology collection of journals, books, and databases** supports the associate degree programs for the technical and design aspects of Mobile App Development."

6. Admissions and Enrollment

A. *List all program admissions requirements for the proposed program*

Applicants must meet the general requirements for acceptance to RIT through NTID as detailed in RIT's Undergraduate Bulletin. RIT and the U.S. Department of Education have agreed on these standards.

Entry criteria into this AAS degree program in Mobile Application Development will be based on the applicant's projected ability to complete graduation within a typical program mask timeline. Incoming first-year NTID students pursuing this degree option will need to meet the following entry requirements:

ACT: Students with an ACT composite score of 17 or higher, with minimum scores of 18 in Mathematics, 16 in English, and 19 in Reading will be considered for direct admission to the program.

English: Placement in a First Year Writing course such as FYW: Writing Seminar (UWRT-150). Students that place into UWRT-100, Critical Reading and Writing would also be considered.

Mathematics: Placement in NTID Mathematics (NMTH-250) or higher. Typically, students entering this major will have completed at least three years of high school mathematics.

Science: Typically, students entering this major will have completed at least two years of high school science.

Internal transfer students who are pursuing this degree option will need to meet the entry requirements for this program as follows:

- Successful completion of NTID NMTH-212 level mathematics course (or equivalent)
- Successful completion of Critical Reading & Writing (UWRT-100) or equivalent;
- Overall GPA in courses at NTID/RIT of 2.8 or higher

B. Describe the process for evaluating exceptions to admission requirements

> The department chairperson will reserve the right to evaluate borderline applicants through the normal NTID admission process.

C. How will the institution encourage enrollment by persons from groups historically described as underrepresented in the discipline or occupation?

> The NTID Admissions Office will recruit and admit deaf and hard-of-hearing students both nationally and internationally. Recruitment practices and procedures will be in accordance with those established by NTID and RIT to promote diversity in the program.

7. Academic Support Services

The ICS department will use a variety of approaches to advise and counsel students in the Mobile Application Development program including use of the NTID Counseling and Academic Advising department who will assign an advisor/counselor to work with our department to serve these students.

Support Services typically used for baccalaureate level programs, including interpreting and note taking, are not applicable to this program (except for liberal arts courses taught by non-NTID faculty) since the Mobile Application Development program is designed as an associate (terminal) degree. However, should a student choose to transfer to a GCCIS program upon completion of this degree, NTID has maintained a strong commitment to the support of d/hh students in baccalaureate programs with special tutoring, interpreting/captioning, and note taking for each course.

8. External Review of Graduate Programs

Not applicable.

9. Credit for Experience

Substantial credit for prior learning derived from experience will not be granted for the Mobile Application Development program.

10.   Program Assessment and Improvement

A. Program Level Outcomes Assessment

The essential goal of the Mobile Application Development program is to prepare students for employment as mobile application developers. Students will gain fundamental skills and knowledge related to mobile application development. The curriculum is designed to foster the development of both hard and soft skills that students will need to begin a successful career.

The curriculum, along with the Program Level Outcomes Assessment Plan, was designed to incorporate a broad view of the mobile application development field. The courses include instruction in object oriented programming, an introduction to HTML and

web development, user interface and user interactive design principles, web services, data acquisition and storage techniques, best practices as it relates to security and general design principles, and soft skills such as effective workplace communications, ethics and social responsibility.

The Mobile Application Development program aligns with the RIT academic program profile by providing students with knowledge and understanding of the following:

- Principles and practices of the mobile computing profession, where the outcomes of technical literacy, ethical reasoning and global interconnectedness are essential.
- Application planning and design that align well with the essential outcomes of critical, creative and innovative thinking.
- The impacts of mobile computing solutions in a global and societal context where outcomes of critical thinking, ethical reasoning, and integrative literacies are fundamental to improvements for society anywhere in the world.

See the Table 6 on the following page for the Outcomes Assessment Plan for the AAS in Mobile Application Development. The chairperson of the Information and Computing Studies department at NTID will coordinate the assessment process. Data will be collected and discussed at annual departmental meetings. Results of outcomes assessment measures and the use of results will be reported at the college level on a yearly basis and posted to RIT's Assessment Management System website at http://www.taskstream.com. The AAS program will be evaluated, annually, based on student success in meeting the identified outcomes and consideration of emerging trends in liberal arts education.

B. *Program Level Outcomes Assessment Plan*

Table 6
Program Name/College: Mobile Application Development / National Technical Institute for the Deaf (NTID)
      Program Contact for Program Assessment: Elissa Olsen (Department Chair)

Program Goals	Student Learning Outcomes	Academic Program Profile	Data Source/Measure Curriculum Mapping	Benchmark	Timeline	Data Analysis Key Findings	Use of Results Action Items and Dissemination
Please List program-level goals	Students will be able to: (task, capability, knowledge, skills, and dispositions) Use measurable verbs.	Alignment to the five RIT essential outcomes - check all that apply	Assessment opportunity (course/experience) method/measures, assignment/rubric)	Standard, target, or achievement level (usually a %) Statement of student Success	Identify when and how data are collected, aggregated, and analyzed	Identify who is responsible and list key findings	Identify how results are used and shared. List any recommendations or action items
Create effective software solutions.	Analyze real world problems and efficiently code solutions	☒ Critical Thinking ☒ Ethical Reasoning ☐ Integrative Literacies ☐ Global Interconnectedness ☒ Creative/Innovative Thinking	NMAD-181 Programming Fundamentals II: Mobile Domain Final Written Exam	80% of students will score a 75% or higher on exam.	Each semester the NMAD-181 Programming Fundamentals II: Mobile Domain course is offered.	Collected by ICS Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report, NTID Annual Report, and the greater Institute as requested.
			NMAD-181 Programming Fundamentals II: Mobile Domain Real world problem analysis - UML Diagram	80% of the students will score a 75% or higher on the UML Diagram			
				Given a UML diagram, 80% of the students will score a 75% or higher in being able to correctly and efficiently code a solution.			

Program Goals	Student Learning Outcomes	Academic Program Profile	Data Source/Measure Curriculum Mapping	Benchmark	Timeline	Data Analysis Key Findings	Use of Results Action Items and Dissemination
			NMAD-290 Mobile Application Development Capstone Projects Course Comprehensive	80% of students will score a 2 or higher with a rubric scale 0-3 on project sections related to being able to correctly and efficiently code a solution.	Each semester the NMAD-290 Mobile Application Development Capstone Projects course is offered.		
Create effective and user-friendly mobile interfaces.	Design, refine and finalize a functional and user-friendly cross-platform user interface.	☒ Critical Thinking ☒ Ethical Reasoning ☐ Integrative Literacies ☐ Global Interconnectedness ☒ Creative/Innovative Thinking	NMAD 250 Mobile App Design Elements Final Project _____ NMAD-290 Mobile Application Development Capstone Projects Course (Project TBD)	80% of the students will earn a 75% or higher score on the NMAD Mobile App Design Elements Final Project _____ 80% of students will score a 2 or higher with a rubric scale 0-3 on the NMAD-289 Project	Each semester the NMAD-250 Mobile App Design Elements course is offered. _____ Each semester the NMAD-290 Mobile Application Development Capstone Projects course is offered.	Collected by ICS Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report, NTID Annual Report, and the greater Institute as requested.
Publish applications across multiple platforms.	Create, secure, test and maintain mobile applications for two or more platforms	☒ Critical Thinking ☐ Ethical Reasoning ☒ Integrative Literacies ☐ Global Interconnectedness ☒ Creative/Innovative Thinking	NMAD-270 Mobile App Development II Final Exam or instructor evaluation (Project TBD) _____ NMAD-290 Mobile Application Development Capstone Projects Course	80% of the students will score a 75% or higher on the NMAD-270 Final Exam or Project (TBD) _____ 80% of students will score a 2 or higher with a rubric scale 0-3 on each section of the Capstone Project(s)	Each semester the NMAD-270 Mobile App Development II course is offered _____ Each semester the NMAD-290 Mobile Application Development Capstone Projects course is offered.	Collected by ICS Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report, NTID Annual Report, and the greater Institute as requested.

Program Goals	Student Learning Outcomes	Academic Program Profile	Data Source/Measure Curriculum Mapping	Benchmark	Timeline	Data Analysis Key Findings	Use of Results Action Items and Dissemination
Utilize effective professional communication and collaboration skills	Demonstrate effective verbal and written communication skills	☐ Critical Thinking ☒ Ethical Reasoning ☒ Integrative Literacies ☒ Global Interconnectedness ☐ Creative/Innovative Thinking	NMAD-270 Mobile App Development II Team Project	100% of the students will demonstrate effective interpersonal and communication skills on the team project rubric (peer and faculty evaluations)	Each Semester NMAD-270 Mobile App Development II is offered.	Collected by ICS Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report, NTID Annual Report, and the greater Institute as requested.
	Work effectively as a member of a team		NMAD-290 Mobile Application Development Capstone Projects Course	100% of students will score a 2 or higher with a rubric scale 0-3 on project section sections related to interpersonal and communication skills	Each semester the NMAD-290 Mobile Application Development Capstone Projects course is offered		
Indicate overall satisfaction with the program and courses.	Synthesize educational experience to determine level of satisfaction	☐ Critical Thinking ☐ Ethical Reasoning ☐ Integrative Literacies ☐ Global Interconnectedness ☐ Creative/Innovative Thinking	Student satisfaction survey instrument When the survey instrument is developed, indicate specific survey items that you will use for assessment of this outcome.	85% of students graduating will indicate "satisfaction" with Mobile Application Development courses and the program on the Student satisfaction survey instrument.	Collection: Annually at the end of the fall semester beginning AY 2019/2020	Collected by ICS Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report, NTID Annual Report, and the greater Institute as requested.

C. Accreditation and Program Review

No external organizations other than NYSED and Middle States will evaluate/accredit the program.

11.   New/Emerging Field and Allied Health Areas

Although this is an emerging program in the field of mobile computing, several such mobile app programs are already in place in other universities. The field of mobile computing has existed now for quite a few years.

12.   Transfer to Baccalaureate Programs

The Mobile Application Development program is intended as a terminal degree. Once established, the ICS department will work to establish an articulation agreement with the RIT's IST department. The IST department Coordinator, Dan Bogaard has reviewed the program mask and course descriptions for the Mobile Application Development program. As stated in his letter of support (see **Appendix C**), "…*at least some of the technical courses will be able to transfer for credit towards a BS level degee in our department. Once the program gets fully approved and I have had the opportunity to review the complete syllabi, we can meet again to review course transferability and draft an articulation agreement.*"

Entry into other four-year programs, either within or outside RIT may be possible as well, although the number of credits accepted for transfer may be less.

13.   Application for Distance Education

Not applicable for this AAS degree program.

APPENDICES

Appendix A - New or Revised Course Outline Form

NMAD-150   Mobile User Interfaces
NMAD-180   Programming Fundamentals I: Mobile Domain
NMAD-181   Programming Fundamentals II: Mobile Domain
NMAD-182   Software Analysis and Design
NMAD-250   Mobile User Experience
NMAD-251   Mobile App Design Elements
NMAD-260   Mobile App Development I
NMAD-261   Mobile App Development II
NMAD-262   Web Services and Data Storage Technologies
NMAD-270   Best Practices for Mobile Development
NMAD-290   Mobile Application Development Capstone Projects
NMAD-299   Mobile Application Development Co-op

NMTH-255   Introduction to Discrete Mathematics

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF

Information and Computing Studies

NEW COURSE: NTID-NMAD-150 Mobile User Interfaces

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/14
College Curriculum Committee	10/24/2014	11/13/14

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Mobile User Interfaces
Credit hours:	3
Prerequisite(s):	NACA-172 Website Development
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom	2	12
Lab	2	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	Spring	X	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

11/24/2014 DEL

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To learn terminology, concepts and principles in user interfaces.
3.2 To learn key players and their respective design guidelines.
3.3 To analyze interaction and application of basic user interfaces principles.
3.4 To learn to integrate individual user interface principles into mobile applications.
3.5 To design mobile applications that comply with best design practices.
3.6 To analyze and write reports on mobile application user interfaces.
3.7 To develop and refine reading skills to understand reference materials.
3.8 To develop and refine analysis and writing skills.

4.0   Course Description

NMAD-150   **Mobile User Interfaces**
User-centered, interactive design is critical to the development of successful consumer-level devices and software, particularly for mobile devices. This course provides students with a solid foundation in developing and understanding a comprehensive range of experiences in user-centered interactive design. The course will cover effective communication principles, user interface design techniques, design tools, workflow, design process, and user interaction. This course will also discuss universal design principles to provide full accessibility for all users.
(NACA-172) **Class 2, Lab 2, Credit 3 (S)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Textbooks:
UI is Communication: How to Design Intuitive, User Centered Interfaces by Focusing on Effective Communication; Everett N. McKay; Morgan Kaufmann; 2013; ISBN: 978-0123969804.
Mobile Design Pattern Gallery: UI Patterns for Mobile Applications; Theresa Neil; O'Reilly Media; 2012; ISBN: 978-1449314323.
Digital Design Essentials: 100 Ways to Design Better Desktop, Web, and Mobile Interfaces; Rajesh Lal; Rockport Publishers; 2013; ISBN: 978-1592538034.
Essential Mobile Interaction Design: Perfecting Interface Design in Mobile Apps; Cameron Banga & Josh Weinhold; Addison-Wesley; 2014; ISBN: 978-0321961570.
Designing the User Interface: Strategies for Effective Human-Computer Interaction; Ben Shneiderman & Catherine Plaisant; Addison-Wesley; 2009; ISBN: 978-0321537355.
Interaction Design: Beyond Human - Computer Interaction; Yvonne Rogers,

Helen Sharp, & Jenny Preece; Wiley; 2011; ISBN: 978-0470665763.

5.2 Instructional: Instructional materials developed by the Information and Computing Studies Department.

5.3. Software: Image creation and manipulation software such as *Adobe Illustrator* Wireframing and storyboarding tools

6.0   Topics (outline):

6.1. Introduction to Mobile Interface Design
- 6.1.1.   Key players in mobile industry
- 6.1.2.   Distinctions between platforms

6.2. Communication Design Principles
- 6.2.1.   Effective Communication
- 6.2.2.   UI Core Principles

6.3. Interactive Design
- 6.3.1.   Interactions
- 6.3.2.   Controls
- 6.3.3.   Feedback
- 6.3.4.   Navigation
- 6.3.5.   Errors, warnings, notifications
- 6.3.6.   Dynamic elements

6.4. Visual Design
- 6.4.1.   Layout
- 6.4.2.   Typography
- 6.4.3.   Color
- 6.4.4.   Icons and glyphs
- 6.4.5.   Animation and transitions

6.5. Design Process and Workflow
- 6.5.1.   Identify design requirements
- 6.5.2.   Sketching
- 6.5.3.   Storyboarding
- 6.5.4.   Wire framing
- 6.5.5.   User feedback
- 6.5.6.   Managing design processes
- 6.5.7.   Platform-specific design guidelines

6.6. Interaction Styles
- 6.6.1.   Common design approaches
- 6.6.2.   Alternative design approaches
- 6.6.3.   App Design for users with disabilities

6.7. Mobile User Interface Guidelines, Principles, and Concepts

6.8. Design Issues
- 6.8.1.   Quality of Service
- 6.8.2.   Balancing Function and Fashion
- 6.8.3.   User Documentation and Online Help
- 6.8.4.   Information Search
- 6.8.5.   Information Visualization

7.0 **Intended course learning outcomes and associated assessment methods of those outcomes** (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Explain terminology, concepts and principles in human computer interaction. *(Goal 3.1)*	Assignments and exams
7.2 Describe key events, people, and ideas in HCI *(Goal 3.2)*	Assignments and projects
7.3 Explain, analyze and evaluate mobile user interfaces *(Goal 3.3)*	Assignments, projects, and exams
7.4 Design and implement user interfaces *(Goal 3.4, 3.5)*	Assignments, projects, and exams
7.5 Describe and summarize research papers on user interfaces *(Goal 3.6, 3.7, 3.8)*	Assignments and projects

8.0 **Program outcomes and/or goals supported by this course embedded into the course, if appropriate**

Program Goal(s)
2. Create effective and user-friendly mobile interfaces
4. Utilize effective professional communication and collaboration skills

Student Learning Outcome(s) for each goal
 2. Students will be able to design, refine and finalize a functional and user-friendly cross platform user interface.
 4a.Students will be able to demonstrate effective verbal and written communication skills

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express oneself effectively in common college-level written forms using standard American English	
	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of	

	information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Demonstrate knowledge of basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations or apply statistical techniques	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the Mobile App Development lab or the Multimedia lab.

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FOR THE DEAF

Information and Computing Studies

NEW COURSE: NTID-NMAD-180 Programming Fundamentals I: Mobile Domain

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/14
College Curriculum Committee	10/24/2014	11/13/14

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Programming Fundamentals I: Mobile Domain
Credit hours:	4
Prerequisite(s):	
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom	3	12
Lab	3	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	X	Spring		Summer		Other	

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

11/24/2014 DEL

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate) This will be a required course by all Mobile Application Design Development students in the AAS program.
Students who might elect to take the course: Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0 Goals of the course (including rationale for the course, when appropriate):

3.1 To understand the development and documentation of algorithm logic by using tools such as flowcharts and pseudo code. 3.2 To develop analytical and problem solving skills using a decomposition paradigm. 3.3 To learn how to apply logic, analytical, and problem solving skills to solve programming problems using a contemporary object-oriented programming language. 3.4 To understand the Event model and implement basic interactive graphical interfaces. 3.5 To understand how to use software development processes to design good programs. 3.6 To develop the study skills and the independent learning skills needed to succeed in the Mobile Application Design and Development program. 3.7 To develop the writing skills needed to clearly explain the nature of a problem and possible solutions. 3.8 To develop the reading skills needed to understand technical materials such as books, journals, and manuals related to computing and problem solving concepts.

4.0 Course description (as it will appear in the RIT Catalog, including pre- and co-requisites, and semesters offered). Please use the following format:

NMAD-180 **Programming Fundamentals I: Mobile Domain** This course will provide students with a study of the fundamental concepts, logical structures, and algorithms inherent to computer programming. Students will learn how to write basic object-oriented programs in a contemporary programming language with a focus on mobile application development. **Class 3, Lab 3, Credits 4 (F)**

5.0 Possible resources (texts, references, computer packages, etc.)

5.1 Possible Texts: *Head First C#,* Andrew Stellman & Jennifer Greene, O'Reilly, 1st Edition, 2008. *ISBN-13: 978-0596514822* *Beginning Object-Oriented Programming with C#,* Jack Purdum, Wrox, 1st Edition, 2012. *ISBN-13: 978-1118336922* *Microsoft Visual C# 2012: An Introduction to Object-Oriented Programming,* Joyce Farrell, Cengage Learning, 5th Edition, 2013. *ISBN-13: 978-1285096339* *5.2 Instructional:* Instructional materials developed by the Information and Computing Studies Department. *5.3. Software:* Up-to-date SDKs and application development tools

6.0   Topics (outline):

6.1 Foundations of Problem Solving and Logical Thinking
  6.1.1   Problem solving methods
  6.1.2   Algorithms
  6.1.3   Boolean Logic
6.2 Foundations of the object-oriented approach
  6.2.1   Basic object-oriented concepts
  6.2.2   Thinking in object-oriented terms
  6.2.3   Principles of object-oriented design
       6.2.3.1 Anatomy of a class
       6.2.3.2 Class design guidelines
  6.2.4   Object-oriented Program Development Process
       6.2.4.1 Problem specification
       6.2.4.2 Problem Decomposition
6.3 Object-oriented constructs
  6.3.1   Class Definition
  6.3.2   Method Definition
  6.3.3   Instance
  6.3.4   Message Passing
  6.3.5   Encapsulation
  6.3.6   Hierarchy
  6.3.7   Inheritance
  6.3.8   Interfaces/Abstract classes
  6.3.9   Enumerations
  6.3.10   Collections
  6.3.11   Data and File Input/Output
  6.3.12   Serialization
6.4 Implementation language constructs
  6.4.1   Data types
  6.4.2   Data structures
  6.4.3   Conditional constructs
  6.4.4   Interactive constructs
6.5 Graphical User Interface
  6.5.1   Design principles and guidelines
  6.5.2   Events
6.6 Software solution implementation
  6.6.1   Solution design
  6.6.2   Solution implementation
6.7 Software solution testing
  6.7.1   Develop test cases
  6.7.2   Apply test cases to software solutions
  6.7.3   Basic debugging and design issues

7.0   Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Use problem solving logic to solve various case scenarios. *(Goal 3.1, 3.2)*	class exercises, homework, quizzes, and tests
7.2 Create programs using a contemporary object-oriented programming language. *(Goal 3.3, 3.4)*	class exercises, homework, quizzes, and tests
7.3 Use decomposition strategies to identify key areas in programming problems that will lead to the solution. *(Goal 3.3)*	class exercises, homework, quizzes, and tests
7.4 Use correct procedures to analyze a problem, diagram (flow chart) the algorithm to solve the problem, and write the code that implements the algorithm. *(Goal 3.1, 3.2, 3.4)*	class exercises, homework, quizzes, and tests
7.5 Implement an object-oriented design to solve a problem in a contemporary programming language. *(Goal 3.5)*	class exercises, homework, quizzes, and tests
7.6 Write program documentation that clearly explains the purpose of the program and comments on the function of program logic. *(Goal 3.7)*	class exercises, homework, quizzes, and tests
7.7 Read programming-related materials independently and correctly use a new feature (or features) of a programming language. *(Goal 3.6. 3.8)*	class exercises and homework

8.0   Program outcomes and/or goals supported by this course

Program Goal(s)
1. Create effective software solutions
Student Learning Outcome(s) for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express oneself effectively in common college-level written forms using standard American English	
	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	

Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Demonstrate knowledge of basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations or apply statistical techniques	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the Mobile App Development lab or the Multimedia lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF

Information and Computing Studies

NEW (or REVISED) COURSE: NTID-NMAD-181 Programming Fundamentals II: Mobile Domain

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/14
College Curriculum Committee	10/24/2014	11/13/14

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Programming Fundamentals II: Mobile Domain
Credit hours:	4
Prerequisite(s):	NMAD-180 Programming Fundamentals I: Mobile Domain
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016-17

	Contact hours	Maximum students/section
Classroom	3	12
Lab	3	12
Studio		
Other (specify)		

11/24/2014 DEL

2.a Semester(s) offered (check)

Fall	Spring	X	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To develop an understanding of hierarchical information modeling using basic Unified Modeling Language.
3.2 To apply object-oriented principles using a contemporary object-oriented programming language.
3.3 To develop skills to implement more complex software solutions using a contemporary object-oriented programming language.
3.4 To understand how to use events and delegates to design and implement interactive graphical interfaces in mobile-oriented environments.
3.5 To apply application decoupling logic to produce improved program design and application performance.
3.6 To understand performance, connectivity, and energy issues within the mobile environment.
3.7 To develop the study skills and the independent learning skills needed to succeed in associate level courses.
3.8 To develop the writing skills needed to write program documentation that clearly explains the purpose of the program and comments on the function of program logic.
3.9 To develop the reading skills needed to understand technical materials such as books, journals, and manuals related to computing and problem solving concepts.

4.0   Course description

NMAD-181   **Programming Fundamentals II: Mobile Domain**
This course builds upon the programming skills developed in Programming Fundamentals I Mobile Domain and will cover more advanced object-oriented programming concepts, logical structures, and algorithms. Visual information system modeling, graphical user interfaces and software testing topics will also be covered. Students will be working individually on mobile-related projects as well as working with other students in team-based projects.   (NMAD-180) **Class 3, Lab 3, Credit 4 (S)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Texts:
Head First C#, Jennifer Greene and Andrew Stellman, O'Reilly Media, 3rd

Edition, 2013. *ISBN-13: 978-1449343507*

Microsoft Visual C# 2013, John Sharp, Microsoft Press, 1st Edition, 2013. *ISBN-13: 978-0735681835*

C# 2012 for Programmers, Paul Deitel and Harvey M Deitel, Prentice Hall, 5th Edition, 2013. *ISBN-13: 978-0133440577*

5.2 Instructional: Instructional materials developed by the Information and Computing Studies Department.

5.3. Software: Up-to-date SDKs and application development tools

6.0 Topics (outline):

6.1 Hierarchical Information Modeling
 6.1.1 Properties of hierarchical structures
 6.1.2 Using XML to model information hierarchies
6.2 Object-oriented constructs
 6.2.1 Modularity
 6.2.2 Encapsulation
 6.2.3 Hierarchy
 6.2.4 Inheritance
 6.2.5 Interfaces/Abstract classes
 6.2.6 Enumerations
 6.2.7 Collections
 6.2.8 Data and File Input/Output
 6.2.9 Serialization
 6.2.10 Exception Handling
 6.2.11 Data Binding
 6.2.12 Asynchronous Programming
6.3 Visual information system modeling - Unified Modeling Language
 6.3.1 UML elements
 6.3.2 UML structure diagrams
6.4 Graphical user interfaces
 6.4.1 Design principles and guidelines
 6.4.2 Data Templates
 6.4.3 Events
 6.4.4 Delegates
6.5 Algorithms for processing data and information structures
6.6 Application Logic Decoupling
 6.6.1 Design Patterns
 6.6.2 Architectural Patterns
 6.6.3 Secure programming techniques
6.7 Data-driven applications
 6.7.1 LINQ
  6.7.1.1 Queries
  6.7.1.2 Clauses
6.8 Software solution testing
 6.8.1 Develop test cases
 6.8.2 Apply test cases to software solutions

6.8.3 Debug basic design issues 6.8.4 Create internal program documentation	

7.0   **Intended course learning outcomes and associated assessment methods of those outcomes** (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Use hierarchical information modeling to organize data into a tree-like structure and illustrate parent/child relationships. *(Goal 3.1)*	class exercises, homework, quizzes, and tests
7.2 Represent an object-oriented problem in a UML design. *(Goal 3.1)*	class exercises, homework, quizzes, and tests
7.3 Analyze a UML diagram to construct a problem. *(Goal 3.1)*	class exercises, homework, quizzes, and tests
7.5 Apply the software development cycle using an object-oriented programming language. *(Goal 3.2, 3,3)*	class exercises, homework, quizzes, and tests
7.6 Develop interactive programs with interactive, graphical screens. *(Goal 3.2, 3.4, 3.6)*	class exercises, projects, quizzes, and tests
7.7 Develop programs that handle simultaneous events. *(Goal 3.2, 3.4)*	class exercises, projects, quizzes, and tests
7.8 Use software testing strategies to debug and validate results. *(Goal 3.2, 3,3)*	projects
7.9 Integrate all of the learned programming skills to create a software solution in a challenging, independent programming project. *(Goal 3.5, 3.6)*	projects
7.10 Write program documentation that clearly explains the purpose of the program and comments on the function of program logic. *(Goal 3.7)*	class exercises and homework, quizzes, and tests
7.11 Read programming-related materials independently and correctly use a new feature (or features) of a programming language. *(Goal 3.8, 3.9)*	class exercises and homework, tests

8.0   **Program outcomes and/or goals supported by this course**

Program Goal(s) 1. Create effective software solutions Student Learning Outcome(s) for each goal 1. Students will be able to analyze real world problems and efficiently code solutions.

9.0   N/A

	General Education Learning Outcome Supported by	**Assessment**

	the Course, if appropriate	Method
Communication		
	Express themselves effectively in common college-level written forms using standard American English	
	Revise and improve written and visual content	
	Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Explain basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations on quantitative data	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
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Information and Computing Studies

NEW (or REVISED) COURSE: NTID-NMAD-182 Software Analysis and Design

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Software Analysis and Design
Credit hours:	3
Prerequisite(s):	NMAD-180 Programming Fundamentals I: Mobile Domain
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Committee
Effective date:	AY 2016-17

	Contact hours	Maximum students/section
Classroom	2	12
Lab	3	12
Studio		
Other (specify)		

11/24/2014 DEL

2.a Semester(s) offered (check)

Fall	Spring	X	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To develop an understanding of hierarchical information modeling using basic Unified Modeling Language.
3.2 To create real-world solutions using general problem-solving guidelines.
3.3 To develop skills to implement software solutions using object-oriented design principles.
3.4 To apply application decoupling logic to produce improved program design and application performance.
3.5 To develop the study skills and the independent learning skills needed to succeed in baccalaureate level courses.
3.6 To develop the writing skills needed to write program documentation that clearly explains the purpose of the program and comments on the function of program logic.
3.7 To develop the reading skills needed to understand technical materials such as books, journals, and manuals related to computing and problem solving concepts.

4.0   Course description

NMAD-182   Software Analysis and Design
Building on the fundamentals of programming, students will learn important topics related to object-oriented design. Topics such as class design, unified modeling language, inheritance, composition, logic building, implementation, design strategies, and testing are emphasized. Upon completion, students will be able to demonstrate an understanding of the software development life cycle including a thorough analysis and design of a real-world software problem.
(NMAD-180) **Class 2, Lab 3, Credit 3 (S)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Texts:
The Object-Oriented Thought Process, Matt Weisfeld, Addison-Wesley Professional, 4th Edition, 2013. *ISBN-13: 978-0321861276*
Head First Object-Oriented Analysis and Design, Brett D. McLaughlin, Gary Pollice and Dave West, O'Reilly Media, 1st Edition, 2006. *ISBN-13: 978-0596008673*
Object-Oriented Analysis and Design with Applications, Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Ph.D.,

JimConallen and Kelli A. Houston, Addison-Wesley Professional, 3rd Edition, 2007. *ISBN-13: 978-020189551X*

5.2 Instructional: Instructional materials developed by the Information and Computing Studies Department.

5.3. Software: UML modeling tools, Microsoft Visio

6.0 Topics (outline):

6.1 Visual information system modeling - Unified Modeling Language
    6.1.1   UML elements
    6.1.2   UML structure diagrams
6.2 Anatomy of a Class
6.3 Class Design Guidelines
6.4 Object-Oriented Design
    6.4.1   Building Objects
    6.4.2   Portable Data
    6.4.3   Serialization
    6.4.4   Marshaling
    6.4.5   Databases
    6.4.6   Web Services
    6.4.7   Mobile Apps
6.5 Inheritance and Composition
6.6 Frameworks
6.7 Code Reuse
6.8 Design Patterns
    6.8.1   Gang of Four Pattern Compositions
    6.8.2   Compound Patterns
    6.8.3   Model View Controller/Model View View-Model
6.9 Decomposition
6.10   Principles and Strategies of Design Patterns
6.11   Software Development Lifecycle
6.12   Algorithms for processing data and information structures
6.13 Application Logic Decoupling

7.0   Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
Learning Outcomes *At the completion of this course, students will be able to:*	**Assessment**
7.1 Use hierarchical information modeling to organize data into a tree-like structure and illustrate parent/child relationships. *(Goal 3.1)*	class exercises, homework, quizzes, and tests
7.2 Represent an object-oriented solution in a UML design. *(Goal 3.1)*	class exercises, homework, quizzes, and tests

7.3	Create solutions using object-oriented analysis and design principles. *(Goal 3.2, 3,3)*	class exercises, homework, quizzes, and tests
7.4	Develop solutions that handle simultaneous events. *(Goal 3.2, 3.4)*	class exercises, projects, quizzes, and tests
7.5	Create testing strategies to debug and validate results. *(Goal 3.2, 3,3)*	projects
7.6	Integrate all of the learned program analysis and design skills to create a software solution in a challenging, independent programming project. *(Goal, 3.5)*	projects
7.7	Write program documentation that clearly explains the purpose of the program and comments on the function of program logic. *(Goal 3.6)*	class exercises and homework, quizzes, and tests
7.8	Read program analysis and design related materials independently and correctly use a new feature (or features) of a programming language. *(Goal 3.7)*	class exercises and homework, tests

8.0 Program outcomes and/or goals supported by this course

Program Goal(s) 1. Create effective software solutions Student Learning Outcome(s) for each goal 1. Students will be able to analyze real world problems and efficiently code solutions.

9.0 N/A

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express themselves effectively in common college-level written forms using standard American English	
	Revise and improve written and visual content	
	Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	

Ethical, Social and Global Awareness	
Analyze similarities and differences in human experiences and consequent perspectives	
Examine connections among the world's populations	
Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy	
Explain basic principles and concepts of one of the natural sciences	
Apply methods of scientific inquiry and problem solving to contemporary issues	
Comprehend and evaluate mathematical and statistical information	
Perform college-level mathematical operations on quantitative data	
Describe the potential and the limitations of technology	
Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy	
Demonstrate creative/innovative approaches to course-based assignments or projects	
Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0 Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the proposed Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
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Information and Computing Studies

NEW COURSE: NTID-NMAD-250 Mobile User Experience

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Mobile User Experience
Credit hours:	3
Prerequisite(s):	NMAD-150 Mobile User Interfaces
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom	2	12
Lab	2	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	X	Spring		Summer		Other	

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To understand the principles of mobile user experiences (Mobile UX)
3.2 To learn to apply UX principles and processes in developing mobile apps
3.3 To develop collaborative skills with customers and programmers on design tasks
3.4 To learn how to create and design usability studies with the development and customer teams
3.5 To develop and refine interview and documentation skills with customers
3.6 To develop the writing skills needed to write documentation with a clear analysis of principles and requirements within mobile user experiences
3.7 To develop the reading skills needed to understand technical materials such as books, journals, and manuals related to computing and problem solving concepts.

4.0   Course description

NMAD-250   **Mobile User Experience**
This course will help students develop a better understanding of the user experience and interaction in the mobile domain. Students will plan and execute various mobile design strategies with usability as the forefront of design. Students will apply best practices in gathering data from usability testing and conduct analysis to make changes that will lead to effective user interfaces. This course will also discuss universal design experiences to provide full accessibility for all users. (NMAD-150) **Class 2, Lab 2, Credits 3 (F)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Textbooks:
Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability; Steve Krug; New Riders; 2014; IBSN: 978-0321965516.
Mobile Usability; Jakob Nielsen and Raluca Budiu; New Riders; 2012; IBSN: 978-0321884480.
Mobile User Experience: Patterns to Make Sense of it All; Adrian Mendoza; Elsevier Science; 2013; IBSN: 978-0596514822.
The UX Book: Process and Guidelines for Ensuring a Quality User Experience; Rex Hartson & Pardha Pyla; Morgan Kaufmann; 2012; IBSN: 978-

0123852410.

Smashinbg UX Design: Foundations for Designing Online User Experience;
Jesmond Allen & James Chudley; Wiley; 2012; IBSN: 978-0470666852.

5.2 Instructional: Instructional materials developed by the Information and Computing
Studies Department.

5.3. Software: Image creation and manipulation software such as *Adobe Illustrator*
Wireframing and storyboarding tools

6.0   Topics (outline):

6.1 User Experience (UX) Principles
6.2 Mobile UX versus Desktop UX
6.3 Mobile Design Strategy
        6.3.1   Mobile Apps
        6.3.2   Mobile Web
        6.3.3   Tablets
        6.3.4   Phones
6.4 Mobile Performance Metrics
6.5 Mobile UX Patterns
6.6 Wireframing and Prototyping
6.7 Research and Evaluation Tools and Techniques
    6.7.1 Stakeholder Interviews
    6.7.2 Requirements Workshops
    6.7.3 Usability Tests
    6.7.4 Competitor Benchmarking
    6.7.5 Conducting Contextual Research
    6.7.6 Analytics
    6.7.7 Surveys
6.8 Accessibility

**7.0   Intended course learning outcomes and associated assessment methods of those
outcomes** (please include as many Course Learning Outcomes as appropriate, one
outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Explain principles, terminology and concepts in UX. *(Goal 3.1)*	Class exercises, homework, quizzes and tests
7.2 Explain, analyze and evaluate basic mobile application user experiences *(Goal 3.2)*	Class exercises, homework, final project
7.3 Perform basic user experience studies and measures *(Goal 3.2)*	Class exercises, homework, final project
7.4 Determine consumer needs and developer capabilities through user experience measures *(Goal 3.3)*	Class exercises, homework, final project

7.5 Assess user experiences through consumer studies *(Goal 3.4)*	Class exercises, homework, final project
7.6 Write a report on an user experience study for a group *(Goal 3.5)*	Report
7.7 Describe industry and research papers on user experience *(Goal 3.6, 3.7)*	Class exercises, homework, quizzes and tests

8.0 Program outcomes and/or goals supported by this course

Program Goal(s)
1. Create effective software solutions
2. Create effective and user-friendly mobile interfaces
4. Utilize effective professional communication and collaboration skills

Student Learning Outcome(s) for each goal
1. Students will be able to analyze real world problems and efficiently code solutions
2. Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
4a. Students will be able to demonstrate effective verbal and written communication skills.

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	**Assessment Method**
Communication		
	Express oneself effectively in common college-level written forms using standard American English	
	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	

	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Demonstrate knowledge of basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations or apply statistical techniques	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the proposed Mobile App Development lab.

**ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM**

**NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF**

Information and Computing Studies

NEW COURSE: NTID-NMAD-251 Mobile App Design Elements

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Mobile App Design Elements
Credit hours:	3
Prerequisite(s):	NMAD-150 Mobile User Interfaces
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom	2	12
Lab	3	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	X	Spring	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To learn the various navigation patterns across multiple platforms.
3.2 To learn key players in the mobile industry and their respective design philosophies.
3.3 To develop an interactive user interface across multiple platforms.
3.4 To understand how individual user interface controls, behaviors and navigation patterns integrate into mobile applications.
3.5 To develop mobile applications which comply with best design practices.
3.6 To improve program documentation within mobile application user interfaces.
3.7 To enhance the reading skills needed to understand technical materials such as books, journals, and manuals related to user interfaces on various platforms.

4.0   Course description (as it will appear in the RIT Catalog, including pre- and co-requisites, and semesters offered). Please use the following format:

NMAD-251   **Mobile App Design Elements**
This course focuses on the implementation of mobile navigation patterns across multiple platforms and examines the most appropriate uses for each platform. Students will learn how to implement various user interface controls, behaviors and navigation patterns. Topics such as project structure, layout systems, advanced UI and data templating will also be discussed. (NMAD-150) **Class 2, Lab 3, Credit 3 (F)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Texts:
Learning Xamarin Studio, William Smith, Packt Publishing, 1st Edition, 2013. *ISBN-13: 978-1783550814*
Mobile Design Pattern Gallery, Theresa Neil, O'Reilly Press, 2nd Edition, 2014. *ISBN-13: 978-1449363635*
5.2 Instructional: Instructional materials developed by the Information and Computing Studies Department.
5.3. Software: Up-to-date SDKs and application development/design tools

6.0   Topics (outline):

6.1 Structure of an interface
      6.1.1   Pages
      6.1.2   Layout
      6.1.3   Views
      6.1.4   Storyboard
      6.1.5   Touch
6.2 User interface design paradigms
      6.2.1 iOS
      6.2.2 Android
      6.2.3 Windows
6.3 Behavior
      6.3.1 Events
      6.3.2 Animation
      6.3.3 Transitions
      6.3.4 Gestures
6.4 Forms
6.5 Tables
6.6 Navigation
      6.6.1 Patterns
      6.6.2 App structure
6.7 Tools
      6.7.1 Controls
      6.7.2 Extensions
      6.7.3 Custom Controls
      6.7.4 Components
6.8 Shared Projects
6.9 Design Strategies
      6.9.1 Form factors
      6.9.2 Mobile platforms

7.0   **Intended course learning outcomes and associated assessment methods of those outcomes** (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 To design and evaluate mobile user interfaces across multiple platforms *(Goal 3.1)*	class exercises, homework, quizzes, and tests
7.2 To develop applications that navigate across multiple pages. *(Goal 3.1)*	class exercises, homework, quizzes, and tests
7.3 To differentiate different UI controls, elements and navigation patterns across multiple platforms. *(Goal 3.2)*	class exercises, homework, quizzes, and tests
7.4 To develop interactive and intuitive applications using appropriate UI controls across multiple platforms. *(Goal 3.3, 3.4, 3.5)*	class exercises, homework, and projects
7.5 Create documentation that explains the design decisions reflected in the user interface chosen for an application. *(Goal 3.6)*	class exercises, homework, and projects
7.6 Describe and summarize user interfaces across multiple platforms. *(Goal 3.7)*	class exercises, homework, and projects

8.0 Program outcomes and/or goals supported by this course embedded into the course, if appropriate

Program Goal(s)
1. Create effective software solutions
2. Create effective and user-friendly mobile interfaces
4. Utilize effective professional communication and collaboration skills
Student Learning Outcome(s) for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.
2. Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
4a. Students will be able to demonstrate effective verbal and written communication skills.
4b. Students will be able to work effectively as a member of a team

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express oneself effectively in common college-level written forms using standard American English	
	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Demonstrate knowledge of basic principles and concepts of one of the natural sciences	

	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations or apply statistical techniques	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the proposed Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF

Information and Computing Studies

NEW (or REVISED) COURSE: NTID-NMAD-260 Mobile App Development I

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Mobile App Development I
Credit hours:	4
Prerequisite(s):	NMAD-181 Programming Fundamentals II: Mobile Domain; NMAD-182 Software Analysis and Design
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom	3	12
Lab	3	12
Studio		
Other (specify)		

11/24/2014 DEL

2.a Semester(s) offered (check)

Fall	X	Spring	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To develop an understanding of the mobile app development model.
3.2 To apply mobile app development principles using a contemporary programming language alongside a contemporary framework.
3.3 To develop and apply skills to implement simple and complex software solutions for mobile apps.
3.4 To understand and apply code-sharing strategies.
3.5 To understand navigation patterns and events to design and implement intuitive, interactive graphical interfaces in mobile-oriented environments.
3.6 To apply proper design patterns to produce improved program design and application performance.
3.7 To develop the writing skills needed to write program documentation that clearly explains the purpose of the program and comments on the function of program logic.
3.8 To develop the reading skills needed to understand technical materials such as books, journals, and manuals related to computing and problem solving concepts.

4.0   Course description

NMAD-260   **Mobile App Development I**
This course introduces mobile application development utilizing modern development tools to build apps on popular mobile platforms using a contemporary programming language. Students will learn and apply code-sharing techniques to create mobile applications in an efficient manner. This course will also examine mobile development tools, native UIs, navigation, and design patterns to build and publish mobile apps. (NMAD-181; NMAD-182) **Class 3, Lab 3, Credit 4 (F)**

5.0　Possible resources (texts, references, computer packages, etc.)

5.1 Possible Texts:

Xamarin Cross-platform Application Development, Jonathan Peppers, Packt Publishing, 1st Edition, 2014. *ISBN-13: 978-1849698467*

Beginning PhoneGap, Thomas Myer, Wrox, 1st Edition, 2011. *ISBN-13: 978-1118156650*

Appcelerator Titanium Application Development by Example Beginner's Guide, Darren Cope, Packt Publishing, 1st Edition, 2013. *ISBN-13:978-1849695008*

5.2 Instructional: Instructional materials developed by the Information and Computing Studies Department.

5.3. Software: Up-to-date SDKs, application development tools and/or 3rd party tools

6.0 Topics (outline):

6.1 Intro to Mobile Development
- 6.1.1　Mobile Applications Development Lifecycle
- 6.1.2　App stores and publishing options
- 6.1.3　Mobile platforms and capabilities

6.2 Mobile Programming Development Model
- 6.2.1　Up-to-date SDKs
- 6.2.2　Third party tools
- 6.2.3　Configuration of development platform
- 6.2.4　Simulators and Devices
- 6.2.5　Debugging strategies
- 6.2.6　Mobile development tools and environments

6.3 Mobile UI Strategies
- 6.3.1　Views
- 6.3.2　View Controllers
- 6.3.3　Layouts

6.4 Navigation Patterns

6.5 Code strategies
- 6.5.1　Code-sharing
- 6.5.2　Debugging
- 6.5.3　Secure programming techniques

6.6 Graphics and animations

6.7 Data storage

6.8 Media

7.0　Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Compare and contrast multiple platforms in the mobile domain. *(Goal 3.1, 3.2)*	class exercises, homework, projects, and tests

7.2 Create interactive apps with interactive, graphical, and multiple screens utilizing platform-specific design guidelines. *(Goal 3.4)*	class exercises, homework, projects, and tests
7.3 Develop and integrate various types of media in mobile apps. *(Goal 3.3)*	class exercises, homework, projects, and tests
7.4 Develop, test, and build apps using mobile app development tools and environments. *(Goal 3.1, 3.2)*	homework and projects
7.5 Develop intuitive, interactive programs with proper navigation patterns and events. *(Goal 3.5)*	class exercises, projects, quizzes, and tests
7.6 Demonstrate proper code-strategies to correctly implement code-sharing, debugging, and secure programming. *(Goal 3.6)*	class exercises, projects, quizzes, and tests
7.7 Use software testing strategies to debug and validate results. *(Goal 3.2, 3,3)*	projects
7.8 Integrate all of the learned mobile development topics to create a software solution in a challenging, independent programming project. *(Goal, 3.3)*	projects
7.9 Write program documentation that clearly explains the purpose of the program and comments on the function of program logic. *(Goal 3.8)*	class exercises and homework, quizzes, and tests
7.10 Read programming-related materials independently and correctly use a new feature (or features) of a programming language. *(Goal 3.7, 3.9)*	class exercises and homework, tests

8.0   Program outcomes and/or goals supported by this course

Program Goal(s)
1. Create effective software solutions
2. Create effective and user-friendly mobile interfaces
4. Utilize effective professional communication and collaboration skills

Student Learning Outcomes for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.
2. Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
4a. Students will be able to demonstrate effective verbal and written communication skills.
4b. Students will be able to work effectively as a member of a team

9.0   N/A

	General Education Learning Outcome Supported by the Course, if appropriate	**Assessment Method**
Communication		
	Express themselves effectively in common college-level	

	written forms using standard American English	
	Revise and improve written and visual content	
	Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Explain basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations on quantitative data	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the proposed Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF

Information and Computing Studies

NEW (or REVISED) COURSE: NTID-NMAD-261 Mobile App Development II

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Mobile App Development II
Credit hours:	4
Prerequisite(s):	NMAD-260 Mobile App Development I
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016-17

	Contact hours	Maximum students/section
Classroom	3	12
Lab	3	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	Spring	X	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To develop an advanced understanding of the cross-platform development model.
3.2 To apply advanced cross-platform development principles using a contemporary programming language.
3.3 To develop and apply skills to implement complex software solutions across multiple platforms.
3.4 To understand and apply code-sharing strategies to successfully execute apps on multiple platforms.
3.5 To understand how to implement program design patterns across multiple platforms to design and implement interactive graphical interfaces in mobile-oriented environments.
3.6 To apply proper design patterns to produce improved program design and application performance.
3.7 To develop the study skills and the independent learning skills needed to succeed in baccalaureate level courses.
3.8 To develop the writing skills needed to write program documentation that clearly explains the purpose of the program and comments on the function of program logic.
3.9 To develop the reading skills needed to understand technical materials such as books, journals, and manuals related to computing and problem solving concepts.

4.0   Course description

NMAD-261   **Mobile App Development II**
This course builds upon the cross-platform development skills developed in Mobile App Development I and will cover more advanced topics such as geolocation, web services, data acquisition, portable class libraries, shared projects, notifications, and other advanced APIs. Students will be expected to create and publish fully functional apps across multiple platforms. (NMAD-260) **Class 3, Lab 3, Credit 4 (S)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Texts:
Xamarin Cross-platform Application Development, Jonathan Peppers, Packt Publishing, 1st Edition, 2014. *ISBN-13: 978-1849698467*
Xamarin Mobile Application Development for Android, Mark Reynolds, Packt Publishing, 1st Edition, 2014. *ISBN-13: 978-1783559169*

Xamarin Mobile Application Development for iOS, Paul F. Johnson, Packt Publishing, 1st Edition, 2014. *ISBN-13: 978-1783559183*

5.2 Instructional: Instructional materials developed by the Information and Computing Studies Department.

5.3. Software: Microsoft Visual Studio and Xamarin

6.0 Topics (outline):

6.1 Cross-Platform Development Model
    6.1.1   Code sharing strategies
    6.1.2   Frameworks
    6.1.3   Configuration of development platform
    6.1.4   Simulators and Devices
    6.1.5   Debugging strategies
    6.1.6   Xamarin tools
6.2 iOS
    6.2.1   View Controllers
    6.2.2   Navigation controllers
    6.2.3   Layouts
    6.2.4   XCode Storyboard
6.3 Android
    6.3.1   View Controllers
    6.3.2   Navigation controllers
    6.3.3   Layouts
6.4 User interfaces
    6.4.1   Mobile-oriented design layout
6.5 Services
    6.5.1   Location based
    6.5.2   Push Notifications
6.6 Application Logic Decoupling
    6.6.1   Portable Class Libraries
    6.6.2   Shared Projects
    6.6.3   Model-View-View Model/Model-View-Controller
    6.6.4   Secure programming techniques

7.0   **Intended course learning outcomes and associated assessment methods of those outcomes** (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
Learning Outcomes *At the completion of this course, students will be able to:*	**Assessment**
7.1 Demonstrate proper code-strategies to correctly implement code-sharing, debugging, and secure programming. *(Goal 3.1, 3.3)*	class exercises, homework, projects, and tests
7.2 Create apps utilizing advanced concepts across multiple platforms. *(Goal 3.2, 3.3)*	class exercises, homework, projects, and tests

7.3	Develop and integrate various types of media in mobile apps. *(Goal 3.3)*	class exercises, homework, projects, and tests
7.4	Develop, build, test, and publish apps using mobile app development tools and environments. *(Goal 3.2, 3.4)*	homework and projects
7.5	Develop intuitive, interactive programs utilizing proper design patterns across multiple platforms. *(Goal 3.5)*	class exercises, projects, quizzes, and tests
7.6	Demonstrate proper code-strategies to correctly implement code-sharing, debugging, and secure programming. *(Goal 3.6)*	class exercises, projects, quizzes, and tests
7.7	Use software testing strategies to debug and validate results. *(Goal 3.2, 3,3, 3.5)*	projects
7.8	Integrate all of the learned mobile development topics to create a software solution in a challenging, independent programming project. *(Goal, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6)*	projects
7.9	Write program documentation that clearly explains the purpose of the program and comments on the function of program logic. *(Goal 3.8)*	class exercises and homework, quizzes, and tests
7.10	Read programming-related materials independently and correctly use a new feature (or features) of a programming language. *(Goal 3.7, 3.9)*	class exercises and homework, tests

8.0   Program outcomes and/or goals supported by this course

Program Goals & Student Learning Outcomes
1. Create effective software solutions
2. Create effective and user-friendly mobile interfaces
4. Utilize effective professional communication and collaboration skills

Student Learning Outcomes for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.
2. Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
4a. Students will be able to demonstrate effective verbal and written communication skills.
4b. Students will be able to work effectively as a member of a team

9.0   N/A

	General Education Learning Outcome Supported by the Course, if appropriate	**Assessment Method**
Communication		
	Express themselves effectively in common college-level written forms using standard American English	
	Revise and improve written and visual content	
	Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	

Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Explain basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations on quantitative data	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the proposed Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE PROPOSAL FORM

NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF

Information and Computing Studies

NEW COURSE: NTID-NMAD-262 Web Services and Data Storage Technologies

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Web Services and Data Storage Technologies
Credit hours:	3
Prerequisite(s):	NMAD-260 Mobile App Development I
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom	2	12
Lab	3	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall		Spring	X	Summer		Other	

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

11/24/2014 DEL

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
This is a required course by all students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To understand the concepts of databases and data storage.
3.2 To learn how to store, update, and delete data using a common query language.
3.3 To learn about different mobile databases available for usage.
3.4 To develop cross-platform Web Services which transmit and retrieve data.
3.5 To develop and refine reading skills to read and understand reference materials
3.6 To develop and refine analysis and writing skills

4.0

NMAD-262   Web Services and Data Storage Technologies
Students learn how to consume server-side web services that can deliver data in different formats to a variety of applications by building on their previous experience with websites and applications. They use a hands-on approach to build and modify different types of databases for use with their web services while exploring how data can and why it should be shared by multiple devices and applications. Students also gain an understanding of how to detect different devices over the Internet and generate specific targeted content. Use of pre-existing components, APIs and frameworks to improve efficiency is also explored. Methods for efficient data-transfer, to increase battery life, are a key topic in this course. Students work individually, as well as with other students, to complete tasks. (NMAD-260) **Class 2, Lab 3, Credits 3 (S)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Textbooks:
Mobile Database Systems; Vijay Kumar; Wiley; 2006; ISBN: 978-0471467922.
Using SQLite; Jay A. Kreibich; O'Reilly Press; 2010; ISBN: 978-0596521189.
5.1 Instructional: Instructional materials developed by the Information and Computing Studies Department.
5.2 Software: Text editor software such as *Microsoft Visual Studio*

6.0   Topics (outline):

6.1 Introduction to Databases and Database Concepts
6.2 Structured Query Language (SQL)
6.3 Mobile Databases

6.3.1 Definition
6.3.2 Mobile Databases vs. Enterprise Databases
6.3.3 Mobile Database Network Topologies
6.3.4 Characteristics of Mobile Environments
6.3.5 Requirements and Expectations for Mobile Databases
6.3.6 Comparison of Mobile Database Products
6.4 Cross-Platform Web Services

7.0   Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Explain database design concepts *(Goal 3.1)*	Class exercises, homework, quizzes and tests
7.2 Write code that inserts, updates, and deletes data from a database *(Goal 3.2)*	Class exercises, homework, quizzes and tests
7.3 Create Web Services that can retrieve data from a data source *(Goal 3.4)*	Class exercises, homework, quizzes and tests
7.4 Create Web Services that can store or update data on a data source *(Goal 3.4)*	Class exercises, homework, quizzes and tests
7.5 Describe mobile databases used in the industry and understand their strengths and limitations *(Goal 3.3, 3.5, 3.6)*	Class exercises, homework, quizzes and tests

8.0   Program outcomes and/or goals supported by this course

Program Goal(s)
1. Create effective software solutions
4. Utilize effective professional communication and collaboration skills
Student Learning Outcomes for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.
4a. Students will be able to demonstrate effective verbal and written communication skills.
4b. Students will be able to work effectively as a member of a team

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	**Assessment Method**
Communication		
	Express oneself effectively in common college-level written forms using standard American English	

	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Demonstrate knowledge of basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations or apply statistical techniques	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0 **Other relevant information** (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the proposed Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE PROPOSAL FORM

NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF

Information & Computing Studies

NEW COURSE: NTID-NMAD-270 Best Practices for Mobile Development

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Best Practices for Mobile Development
Credit hours:	3
Prerequisite(s):	NMAD-260 Mobile App Development I
Co-requisite(s):	
Course proposed by:	Mobile Application Development Development Team
Effective date:	AY 2016-17

	Contact hours	Maximum students/section
Classroom	2	12
Lab	3	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	Spring	X	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

11/24/2014 DEL

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
All students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To understand the principles of the software development process and best practices specifically for developing mobile applications.
3.2 To understand the principles of the quality management in testing mobile applications.
3.3 To understand the principles of project management to deliver and/or maintain software in a timely manner within budget and requirement constraints.
3.4 To develop collaborative skills with customers, programmers, and project team on projects.
3.5 To develop the technical writing skills for project and user documentation.
3.6 To develop and refine reading skills to understand reference materials.

4.0   Course description

NTID-NMAD - 270   **Best Practices for Mobile Development**
Having already studied the process of creating mobile applications and submitting them to various marketplaces, students will apply best practices for designing, developing and promoting mobile solutions. Topics include coding standards, unit testing, configuring network servers, configuring information architecture, sustainability and security for mobile websites and applications. Students will analyze case studies and present demonstrations of security issues when transmitting and storing information. (NMAD-260) **Class 2, Lab 3, Credits 3 (S)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Possible Texts:
Software Engerineering: A Practitoner's Approach, Roger Pressaman and Bruce R. Maxim, McGraw-Hill Higher Education, 8th Edition, 2014. *ISBN-13: 9780078022128*
Code Complete: A Practical Handbook of Software Construction, Steve McConnell, Microsoft Press, 2nd Edition, 2014. *ISBN-13: 978-1849698467*
5.2 Instructional: Instructional materials developed by the Information and Computing Studies Department.
5.3. Software: Visual Studio and/or 3rd party tools

6.0   Topics (outline):

6.1 The Nature of Software
6.2 Software Engineering
6.3 Part One The Software Process

7.0   Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Explain principles, terminology, and concepts in the software process and best practices. *(Goal 3.1, 3.2, 3.3, 3.4, 3.5)*	class exercises, homework, projects, and tests
7.2 Develop and integrate the modeling and design in signing mobile applications. (*Goal 3.2*)	class exercises, homework, projects, and tests
7.3 Develop performance quality management in testing mobile applications. (*Goal 3.3*)	class exercises, homework, projects, and tests
7.4 Determine and write consumer needs and developer capabilities in managing software projects. *(Goal 3.4, 3.5, 3.6)*	class exercises, homework, projects, and tests
7.5 Demonstrate teamwork in projects. *(Goal 3.1, 3.2, 3.3, 3.4)*	Assignments, Lab Activities, Peer Evaluations

8.0 Program outcomes and/or goals supported by this course

Program Goal(s)
1. Create effective software solutions
2. Create effective and user-friendly mobile interfaces
3. Publish applications across multiple platforms
4. Utilize effective professional communication and collaboration skills

Student Learning Outcomes for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.
2. Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
3. Students will be able to create, secure, test and maintain mobile applications for two or more platforms.
4a. Students will be able to demonstrate effective verbal and written communication skills.
4b. Students will be able to work effectively as a member of a team

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express oneself effectively in common college-level written forms using standard American English	
	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	

Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Demonstrate knowledge of basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations or apply statistical techniques	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE PROPOSAL FORM

**NATIONAL TECHNICAL INSTITUTE
FOR THE DEAF**

Information and Computing Studies

NEW COURSE: NTID-NMAD-290 Mobile Application Development Capstone Projects

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Mobile Application Development Capstone Projects
Credit hours:	3
Prerequisite(s):	NMAD-261 Mobile App Development II, NMAD-262 Web Services and Data Storage Technologies, NMAD-270 Best Practices for Mobile Development
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom	1	12
Lab	4	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	X	Spring	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

11/24/2014 DEL

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
All students in the Mobile Application Development program.
Students who might elect to take the course:
Any student with department approval.

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0 **Goals of the course** (including rationale for the course, when appropriate):

3.1 To further students' critical/innovative thinking skills in finding solutions to "world of work" mobile application design and development problems.
3.2 To improve ethical and professional protocol and behavior in the students' approach to problem solving
3.3 To encourage students to incorporate and integrate teamwork in brainstorming solutions to technical problems.
3.4 To further develop students' group problem-solving and interpersonal skills.
3.5 To further develop students' general presentation skills.
3.6 To further develop students' technical writing skills.
3.7 To further develop students' reading skills needed to understand technical materials such as textbooks, professional journals, and manuals provided by equipment and software manufacturers.

4.0 **Course description**

NMAD-290   **Mobile Application Development Capstone Projects**
Working in teams, students experience the analysis, design, implementation, testing and deployment of a mobile solution for a real-world client. Important topics from throughout their program of study are applied in this course. Faculty advisors facilitate student teams to demonstrate their skills in the applied project. Student teams make a technical presentation to their faculty advisors and participate in a public showcase of projects. (NMAD-261, NMAD-262, NMAD-270) **Class 1, Lab 4, Credits 3 (F)**

5.0 **Possible resources (texts, references, computer packages, etc.)**

5.1 Instructional: Instructional materials developed by the Information and Computing Studies Department. *5.2 Software:* Text editor software such as *Microsoft Visual Studio 2013*

6.0 **Topics (outline):**

6.1 Conceptualization of the project; project planning, and management
6.2 Design considerations
6.3 Development considerations
6.4 Testing considerations
6.5 Security considerations
6.6 Deployment considerations
6.7 Ethical concerns and considerations
6.8 Device and application troubleshooting
6.9 Collection and tabulation of data (as appropriate)

| 6.10 Documentation/Project Report |
| 6.11 Demonstration of the project deliverable |

7.0   Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 *To further students' critical/innovative thinking skills in finding solutions to "world of work" mobile application development problems. (3.1)*	
7.1.1 Demonstrate understanding of project scope and benefits of project management including cost, time, equipment, and personal analysis.	Assignments, Lab Activities
7.1.2 Demonstrate knowledge of mobile application development practices as learned in the Mobile Application Design and Development program.	Assignments, Lab Activities
7.1.3 Demonstrate appropriate use of testing methodologies used to test and troubleshoot mobile applications.	Assignments, Lab Activities
7.2 *To improve ethical and professional protocol and behavior in the students' approach to problem solving. (3.2)*	
7.2.1 Identify ethical issues associated with problems and solutions	Assignments, Lab Activities
7.2.2 Demonstrate professional behavior in dealing with all aspects of a team project.	Assignments, Lab Activities, Peer Evaluations
7.3 *To encourage students to incorporate and integrate teamwork in brainstorming solutions to technical problems (3.3)*	
7.3.1 Demonstrate teamwork in brainstorming and finding possible solutions for a project.	Assignments, Lab Activities, Peer Evaluations
7.4 *To further develop students' group problem-solving and interpersonal skills. (3.4)*	
7.4.1 Demonstrate leadership and other interpersonal skills in working effectively with others.	Assignments, Lab Activities, Peer Evaluations
7.5 *To further develop students' presentation skills (3.5)*	
7.5.1 Demonstrate the ability to give a clear and concise presentation of the project to faculty and peers.	Presentations
7.6 *To further develop students' technical writing skills (3.6)*	
7.6.1 Demonstrate the ability to clearly articulate in writing all aspects of a project.	Assignments, Lab Activities
7.7 *To further develop students' reading skills needed to understand technical materials such as textbooks,*	

professional journals, and manuals provided by equipment and software providers. (3.7)	
7.7.1 Demonstrate the ability to extract relevant information from available resources in an effort to find and document project solutions.	Assignments, Lab Activities

8.0   Program outcomes and/or goals supported by this course

Program Goal(s)
1. Create effective software solutions
2. Create effective and user-friendly mobile interfaces
3. Publish applications across multiple platforms
4. Utilize effective professional communication and collaboration skills
5. Indicate overall satisfaction with the program and courses.

Student Learning Outcomes for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.
2. Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
3. Students will be able to create, secure, test and maintain mobile applications for two or more platforms.
4a. Students will be able to demonstrate effective verbal and written communication skills.
4b. Students will be able to work effectively as a member of a team
5. Graduating students will synthesize educational experience to determine level of satisfaction.

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express oneself effectively in common college-level written forms using standard American English	
	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	

Ethical, Social and Global Awareness	
Analyze similarities and differences in human experiences and consequent perspectives	
Examine connections among the world's populations	
Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy	
Demonstrate knowledge of basic principles and concepts of one of the natural sciences	
Apply methods of scientific inquiry and problem solving to contemporary issues	
Comprehend and evaluate mathematical and statistical information	
Perform college-level mathematical operations or apply statistical techniques	
Describe the potential and the limitations of technology	
Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy	
Demonstrate creative/innovative approaches to course-based assignments or projects	
Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

This course will be taught in the proposed Mobile App Development lab.

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

NATIONAL TECHNICAL INSTITUTE FOR THE DEAF

Information and Computing Studies Department

REVISED COURSE: NTID-NMAD-299- Mobile Application Development Co-op

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10/20/2014	10/22/2014
College Curriculum Committee	10/24/2014	11/13/2014

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Mobile Application Development Co-op
Credit hours:	0
Prerequisite(s):	NACT-240 The World of Work NMAD-261 Mobile App Development II NMAD-270 Best Practices for Mobile Development NMAD-262 Web Services and Data Storage
Co-requisite(s):	
Course proposed by:	Mobile Application Development Curriculum Team
Effective date:	AY 2016/17

	Contact hours	Maximum students/section
Classroom		
Lab		
Studio		
Other (specify)	350 hours of program related work experience	

2.a Semester(s) offered (check)

Fall X	Spring X	Summer X	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: (by program and year, as appropriate)
All students in the Mobile Application Development program
Students who might elect to take the course:

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1. To provide practical working experience that reinforces classroom instruction.
3.2. To develop on-the-job skills for future full-time employment.

4.0   Course description

NMAD-299   Mobile Application Development Co-op
This course provides students with a 350-hour work experience in the computer field. Students have an opportunity to gain experience on the job, to apply what they have learned in their course work, and to evaluate their own technical, communication, and interpersonal skills. Placement assistance is provided to help students find a relevant work experience. (NMAD-240, NMAD-261, NMAD-262, NMAD-270)
Class 0, Credit 0 (F, S, Su)

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Instructional: Supervisor and student self-evaluation of performance.
5.2 Department faculty
5.3 National Center on Employment staff and resources

6.0   Topics (outline):

6.1 Technical Skills
6.2 Communication skills
6.3 Interpersonal skills

7.0   Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Student completes a minimum of 350 hours of work as a computer technician (Goals 3.1 & 3.2)	Faculty review of co-op placement
7.2 Student completes co-op self evaluation form and submits to Co-op Coordinator (Goals 3.1 & 3.2)	Review of student's self-evaluation
7.3 Employer completes online evaluation and submits to RIT Co-op web site (Goals 3.1 & 3.2)	Review of supervisor's evaluation

8.0   Program outcomes and/or goals supported by this course

Program Goals & Student Learning Outcomes
1. Create effective software solutions
2. Create effective and user-friendly mobile interfaces

3. Publish applications across multiple platforms
4. Utilize effective professional communication and collaboration skills
5. Indicate overall satisfaction with the program and courses.

Student Learning Outcomes for each goal
1. Students will be able to analyze real world problems and efficiently code solutions.
2. Students will be able to design, refine and finalize a functional and user-friendly cross-platform user interface.
3. Students will be able to create, secure, test and maintain mobile applications for two or more platforms.
4a. Students will be able to demonstrate effective verbal and written communication skills.
4b. Students will be able to work effectively as a member of a team
5. Graduating students will synthesize educational experience to determine level of satisfaction.

9.0   N/A

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express themselves effectively in common college-level written forms using standard American English	
	Revise and improve written and visual content	
	Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Explain basic principles and concepts of one of the natural sciences	

	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations on quantitative data	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE PROPOSAL FORM

National Technical Institute for the Deaf

Department of Science and Mathematics

NEW COURSE NTID-NMTH-255-Introduction to Discrete Mathematics

1.0 Course Designations and Approvals

Required course approvals:	Approval request date:	Approval granted date:
Academic Unit Curriculum Committee	10-10-14	10-17-14
College Curriculum Committee	10-24-14	11-13-14

Optional designations:	Is designation desired?		*Approval request date:	**Approval granted date:
General Education:	**Yes: AAS**		2-24-15	3-3-15
Writing Intensive:		**No**		
Honors		**No**		

2.0 Course information:

Course title:	Introduction to Discrete Mathematics
Credit hours:	3
Prerequisite(s):	UWRT-100 Critical Reading and Writing or equivalent; and NMTH-212-Integrated Algebra or appropriate math placement
Co-requisite(s):	
Course proposed by:	Bonnie Jacob, Mitchell Bacot, Jacqueline McClive and Sharron Webster
Effective date:	AY 2016-2017

	Contact hours	Maximum students/section
Classroom	2	12
Lab	2	12
Studio		
Other (specify)		

2.a Semester(s) offered (check)

Fall	Spring X	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual basis, please indicate here:

2.b Student Requirements

Students required to take this course: Students enrolled in the Mobile Application Design Program

Students who might elect to take the course: Students who would like to prepare for successful completion of COS-MATH-131-Discrete Mathematics.

3.0   Goals of the course (including rationale for the course, when appropriate):

3.1 To provide knowledge of the mathematical concepts needed for mobile app development, and a foundation in introductory discrete mathematics principles in preparation for higher-level discrete mathematics courses.   3.2 To emphasize the interface between language (ASL and English), discrete mathematics, and symbol systems.   3.3 To develop reading, writing, and critical thinking skills related to discrete mathematics content.   3.4 To develop skills in communicating discrete mathematics ideas and conclusions in writing and face-to-face using English and ASL.

4.0   Course description (as it will appear in the RIT Catalog, including pre- and co-requisites, and semesters offered). Please use the following format:

NMTH-255   **Introduction to Discrete Mathematics**   This course utilizes a lecture/lab format to introduce discrete mathematics topics such as logic, sets, number systems, counting, functions, graph theory, sequences and recursion. The applications of these topics to various topics in computing will be emphasized. (UWRT-100 or equivalent and NMTH-212 or appropriate math placement score) **Class 2, Lab 2, Credit 3 (S)**

5.0   Possible resources (texts, references, computer packages, etc.)

5.1 Text: Kolman, Busby and Ross, <u>Discrete Mathematical Structures.</u>   5.2 Text: Rosen, <u>Discrete Mathematics and its Applications.</u>   5.3 Text: Johnsonbaugh, <u>Discrete Mathematics.</u>   5.4 Instructor-developed material

6.0   Topics (outline):

6.1 Logic
     6.1.1 Conjunction, disjunction and negation
     6.1.2 Tautologies and contradictions
     6.1.3 Logical implication and truth tables
     6.1.4 First order quantifiers
     6.1.5 Mathematical reasoning and proof*
 6.2 Sets

6.2.1 Sets, subsets, power sets and Venn diagrams
6.2.2 Set representations
6.2.3 Intersections, unions and complements
6.3 Number Systems
6.3.1 The binary and hexadecimal systems
6.3.2 Divisibility and modular arithmetic
6.4 Counting
6.4.1 Permutations
6.4.2 Combinations
6.5 Functions
6.5.1 Relations
6.5.2 Equivalence relations
6.5.3 One-to-one, onto and inverse functions
6.5.4 Recursively defined functions
6.5.5 Mathematical induction*
6.6 Graph Theory
6.6.1 Graph families including complete graphs, cycles, trees, directed graphs and weighted graphs
6.6.2 Graph isomorphisms
6.6.3 Graph traversal problems
6.6.4 Graph coloring problems
6.7 Sequences
6.7.1 Fibonacci and other recursive sequences
6.7.2 Series and Sigma notation*

* indicates that topic is optional and may be covered at instructor's discretion if time permits

7.0   Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Translate discrete mathematics symbolic statements into language (ASL and English) and the reverse. (3.2)	Homework and tests
7.2 Convert standard (base 10) numbers to other number systems and the reverse. (3.1)	Homework, tests, and labs
7.3 Apply logic to make and justify deductions about discrete mathematical concepts. (3.1, 3.3, 3.4)	Homework and labs
7.4 Solve counting problems and interpret answers in the context of the problem. (3.1, 3.2)	Homework and tests
7.5 Apply basic concepts and vocabulary related to sets. (3.1)	Homework and tests
7.6 Identify well-known graph families and pairs of isomorphic graphs. (3.1)	Homework and tests
7.7 Solve coloring and traversal problems on graphs. (3.1)	Homework, tests, and labs

7.8 Identify functions, equivalence relations, one-to-one functions, and onto functions. (3.1)	Homework and tests
7.9 Use and understand function notation including for recursively defined functions. (3.1, 3.2)	Homework and tests
7.10 Apply logic principles to English statements and interpret conclusions in English. (3.2, 3.3, 3.4)	Homework, tests, and labs
7.11 Identify patterns in sequences. (3.1)	Homework and tests
7.12 Interpret and apply sigma notation for series. (3.1, 3.2)	Homework and tests

8.0   Program outcomes and/or goals supported by this course

N/A

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	Assessment Method
Communication		
	Express oneself effectively in common college-level written forms using standard American English	
	Revise and improve written products	
	Express oneself effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Demonstrate knowledge of basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
X	Comprehend and evaluate mathematical and statistical information	Final exam
X	Perform college-level mathematical operations or apply statistical techniques	Final exam

	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

10.0   Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

As with most of the NMTH courses, this course should be offered in a room with access to Smart Notebook and related software, and dual projectors because of the extensive use of technology.

Appendix B – Enrollment and Market Analysis

A. Detailed enrollment projections for the next five years

For two years, the ICS department in NTID has been offering a special topics course called "Windows Phone App Development". Each time the course has been offered, we have achieved maximum class enrollment. Most of the students taking the course are either currently or formerly in one of ICS' associate degree programs.

In the spring of 2014, the ICS department conducted a one-question clipboard survey for all students in the ICS department to gauge student interest in a program focusing on mobile app development. The question posed was, "If a program that teaches how to create apps on mobile devices (smartphones, tablets, etc.) were offered when you came to NTID, would you have considered applying to this program?" The results were profound. Of 51 respondents, 45 answered "Yes".

Based on the app development course we offered, the student survey we conducted, program awareness through potential HS dual credit offerings and the natural affinity young people have for mobile devices, we anticipate this will be a popular program. Resource constraints however will require us to limit enrollment to 12 new students per year, with new student accepted only in fall semesters. Students accepted into this program will be screened to meet the enrollment criteria of this associate degree, The screening includes, but is not limited to math and English placement testing once they arrive at RIT, evaluation of transfer credits from other post-secondary institutions, and honors, AP or dual credits from high school.

The **Appendix B Table** below, details the 5-year Mobile Application Development program enrollment, persistence and graduation rate projections that were reviewed and approved by Dr. Jim Miller, Senior VP of Enrollment Management and Career Services at RIT. This table shows that we anticipate accepting one internal transfer student per year, one new student that will be accepted into the program that would come to NTID even if the program did not exist (per year), and 10 students that will be accepted into the program that would not otherwise come to NTID (per year). The table further reflects an anticipated 80% retention through year one (Fall, Year 1 to Fall, Year 2) and a 72% retention through year 2, (Fall, Year 2 to Fall, Year 3). At the end of fall semester, Year 3, 9 students will have graduated from the program, taking the total number of student in the spring semester, Year 3 down to 22 from 31 in the fall semester.

Appendix B Table

Mobile Application Development AAS Enrollment Projections

	Year 1 Internal Transfer	Year 1 Would come to NTID w/o program	Year 1 NEW to NTID	TOTAL	Year 2 Internal Transfer	Year 2 Would come to NTID w/o program	Year 2 NEW to NTID	Persisting	TOTAL	Year 3 Internal Transfer	Year 3 Would come to NTID w/o program	Year 3 NEW to NTID	Persisting	TOTAL	Year 4 Internal Transfer	Year 4 Would come to NTID w/o program	Year 4 NEW to NTID	Persisting	TOTAL	Year 5 Internal Transfer	Year 5 Would come to NTID w/o program	Year 5 NEW to NTID	Persisting	TOTAL
Enrollment Fall Semester	1	1	10	12	1	1	10	10	22	1	1	10	19	31	1	1	10	19	31	1	1	10	19	31
Enrollment Spring Semester	1	1	10	12	1	1	10	10	22	1	1	10	10	22	1	1	10	10	22	1	1	10	10	22
Total Semesters of Enrollment	2	2	20	24	2	2	20	20	44	2	2	20	29	53	2	2	20	29	53	2	2	20	29	53

B. Anticipated graduation rate

The ICS department believes that the Mobile Application Development program will attain a graduation rate of approximately 70 percent (retaining 72% of students by fall, year 3) due to entry level screening, learning support community activities that will lead to increased student motivation, and industry collaboration and partnership efforts. Mobile Application Development enrollment, persistence and graduation rate projections were reviewed and approved by Dr. Jim Miller, Senior VP of Enrollment Management and Career Services at RIT.

C. Competing programs (regional and national)

According to the NYS Inventory of Registered Programs, http://www.nysed.gov/heds/IRPSL1.html only three AAS degree programs were identified that closely related to Mobile Application Development in NYS. Two are distance learning programs and one is an in-class program. All three are sub-par to our program in terms of technical content.

Outside of NYS, there are also a limited number of associate degree programs focusing on Mobile Application Development.

The table below shows the three colleges in NYS offering a Mobile Application related program and a few of the colleges outside of NYS offering such a program.

College	Location	Degree	Program	Link
Herkimer County Community College	Herkimer, NY	AAS	Mobile Application Development	http://www.herkimer.edu/learn/programs-and-majors/program/37/mobile-applications-development-a-a-s-
Bryant & Stratton College	Various, NY	AAS (online)	Mobile Application Development	http://www.bryantstratton.edu/degrees/associate-degrees/aas-mobile-applications-development
Pace University	Various, NY	AAS (online)	Mobile Application Development	http://www.pace.edu/continuing-professional-education/mobile-applications
Rasmussen College	Various	AAS	Software Application Development	http://www.rasmussen.edu/degrees/technology/computer-science/
Stark State College	N. Canton, OH	AAS	Mobile App Development	http://www.starkstate.edu/academic-programs/mobile-app-development
Milwaukee Area Tech College	Milwaukee, MN	AAS	Mobile Developer	http://www.matc.edu/student/offerings/2013-2014/degrees/mobiledesignercurric.cfm
Delaware County Community College	Various, Delaware County, PA	AAS	Mobile Computing	http://www.dccc.edu/academics/academic-divisions/business-cis/mobile-computing-program
Johnson County Community College	Overland Park, KS	AAS	Web Technologies	http://www.jccc.edu/photo_stories/2012/1210-web-technologies.html

D. Anticipated geographic draw (regional, national and international)

The NTID Admissions Office will recruit and admit deaf and hard-of-hearing students both nationally and internationally. Recruitment practices and procedures will be in accordance with those established by NTID and RIT.

E. *Program delivery format (full-time, part-time, on-site, off-site, distance learning, weekend learning)*

This program will have an in-class format and will predominantly serve full-time students who will be on campus two semesters each year.

Appendix C – Internal Letters of Support

Elissa Olsen, Department Chair	NTID Information and Computing Studies
Jennifer Gravitz, Department Chair	NTID Department of Liberal Studies
Scott Hooker, Director of Admissions	NTID Enrollment Management
Matthew Lynn, Department Chair	NTID Department of Science & Mathematics
Mary Lou Basile, Department Chair	NTID Business Studies
John Macko, Director NCE	NTID Center of Employment
Dan Bogaard, IST Coordinator	GCCIS Information Sciences and Technologies
Stephen Jacobs, Professor	GCCIS Interactive Games and Media
Steven Zilora, Department Chair	GCCIS Information Sciences and Technologies
Joan Naturale, Deaf Education Librarian	RIT Wallace Library
Stephen Nelson, Director of Operations	NTID Access Services
James Winebrake, Dean	COLA

R·I·T   Rochester Institute of Technology

Information & Computing Studies
National Technical Institute for the Deaf
Hugh L. Carey Building
96 Lomb Memorial Drive
Rochester, New York 14623-5608
585-475-2225 (Voice/TTY)
Fax 585-475-7101

October 24, 2014

To: NTID Curriculum Committee
From: Elissa Olsen, Administrative Chairperson
             Information and Computing Studies Department
Date: October 24, 2014
Subject: Mobile Application Development – Associate Degree Program

This memo is to acknowledge my unequivocal support for Associate of Applied Science in Mobile Application Development. This program is a direct outcome of NTID's intentional efforts to develop new programs and to the growing interest expressed by deaf and hard-of-hearing students in pursuing a career in Mobile Application Development. Internal and external letters of support document the need, demand, and attractiveness of an Associate of Applied Science in Mobile Application Development.

This new program addresses the fact that mobile devices in the workplace are not being used to their full potential. According to CompTIA, an IT trade association, stated "the possibilities available to enterprise users with smartphones and tablets are hampered by a fundamental lack of resources, personnel and _education_ in creating an effective mobile workforce."   If approved, this new offering will strengthen NTID's academic portfolio and provide a competitive advantage with other colleges with similar programs.

Classroom and lab utilization for Mobile Application Development program is integrated in the relocation plan for ICS Department move from Carey Hall to Johnson Hall. Mobile Application Development program will be able to share classroom, Multimedia Lab and Self-Instruction Lab (SIL). Additionally, the Mobile Application Development program will have its own designated lab. Regarding required courses, if Mobile Application Development students choose to take a course such as the NACA-161 or NACA-174 course as their technical elective the respective ICS program will accommodate them.

I am most optimistic and look forward with positive anticipation for the potential options and success this program will offer to our students.

Should you have further questions, please do not hesitate to contact me.

October 24, 2014

NTID Curriculum Committee
NTID
25 Andrews Memorial Drive
Rochester, NY 14634

RE: NTID Department of Information and Computing Studies
      Mobile App Program Proposal

Dear Committee Members:

As chair of the NTID Department of Liberal Studies (DLS), I am writing to express my support for the Mobile App degree program proposed by the NTID Department of Information and Computing Studies.

Students in the proposed AAS degree program must complete First Year Writing: Writing Seminar, UWRT 150 and four general education perspective courses to satisfy its graduation requirements. If students enter the proposed AAS degree program and need developmental English coursework, they will be enrolled in the DLS Intensive English program (NENG 221, 222, 231 and 232) to gain the skills needed to progress to First Year Writing: Writing Seminar, UWRT 150.

Whether Mobile App students enter at the developmental course sequence or at the First Year Writing: Writing Seminar UWRT 150 level, DLS can and will accommodate them in our existing course offerings.

The proposed degree will provide an exciting academic program for students who continue to study at the baccalaureate level or who enter the workplace. On behalf of my DLS colleagues, the NTID Department of Liberal Studies is ready to support the ICS Mobile App students with the English and general education courses they need!

Very truly yours,

JENNIFER L. GRAVITZ

Jennifer L. Gravitz, J.D.
Associate Professor and Chair
NTID Department of Liberal Studies

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NTID Office of Admissions
Lyndon Baines Johnson Hall
52 Lomb Memorial Drive
Rochester, NY 14623-5604
585-475-6700
585-743-1366 (videophone)
866-644-6843 (toll free)
585-475-2696 (fax)

October 24, 2014

Elissa Olsen
Chair, Information and Computing Studies
National Technical Institute for the Deaf
52 Lomb Memorial Drive
Rochester, New York   14623

Dear Elissa,

I am pleased to write this letter of support for the new Mobile Application Development Associates Degree program currently being developed at RIT/NTID. Once approved, I look forward to working with your department in the recruitment of new students.

With the use of mobile technology on the rise, and more importantly, with the popularity of apps for mobile devices, this is a perfect time to bring this program of study to RIT, giving us the advantage over other colleges across the country. For this program to be available to our deaf and hard-of-hearing population is even better. Young people today are very familiar with the variety of mobile applications on the market today, and for our students to be a part of this growing field will greatly benefit RIT.

As we look to the future academic component of NTID, it is important that we are cutting edge and incorporate programs of study that will use the latest technologies that are popular with students. The Mobile Application Development program will assist us in reaching enrollment goals, and students will be excited about this program. I am especially pleased to offer my support.

If you have any questions, please do not hesitate to contact me.
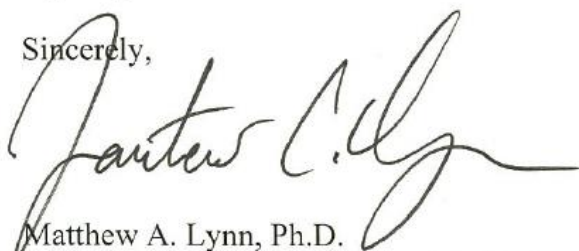
Sincerely yours,

Scott C. Hooker, Director
NTID Office of Admissions
Rochester Institute of Technology

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Rochester Institute of Technology

National Technical Institute for the Deaf
Department of Science and Mathematics
Lyndon Baines Johnson Building
52 Lomb Memorial Drive
Rochester, NY 14623-5604
585-475-6478

October 23, 2014

Curriculum Review Committee,

I support the proposal for NMTH 255 - Introduction to Discrete Mathematics that has been developed by faculty members in my department. We have sufficient resources to offer this course once per year during spring semester to students who will be enrolled in the proposed Mobile Application Design & Development AAS program at NTID and/or who wish to prepare for the baccalaureate-level Discrete Mathematics (MATH 131) course offered by RIT's College of Science. Several faculty members in my department have experience teaching or tutoring in this area of mathematics and one of them is currently performing research in this field, so I am confident that we will be able to offer a quality course.

Sincerely,

Matthew A. Lynn, Ph.D.
Interim Chairperson and Associate Professor of Chemistry

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Rochester Institute of Technology

Business Studies Department
National Technical Institute for the Deaf
52 Lomb Memorial Drive
Rochester, NY 14623

October 24, 2014

To: NTID Curriculum Committee

I support the Mobile Applications Development AAS degree as proposed by the Information and Computing Studies (ICS) Department.

As part of this major, students will take *World of Business and Innovation* from the Business Studies Department in the Fall semester of their second year. This course will give the students a foundation of knowledge that will aid them when working for small or large businesses. It will also give them basic concepts to consider when starting a business of their own.

Our department is able to serve these students without additional cost if the number of students from ICS does not require a second section of the course. Having students take the course in their second year will help to ensure that the AAS students have the English reading and writing skills necessary to challenge this course. Currently our course enrolls only AS level Business students.

If you require further information, please contact me.

Mary Lou Basile
Chairperson

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October 28, 2014

Mr. Brian Trager
Rochester Institute of Technology
National Technical Institute for the Deaf
Information and Computing Studies Department

Dear Mr. Trager:

The NTID Center on Employment (NCE) is in full agreement with the proposed establishment of a new Associate of Applied Science (AAS) in Mobile Application Design and Development program. The establishment of this AAS degree program is consistent with what the technology industry is seeking.
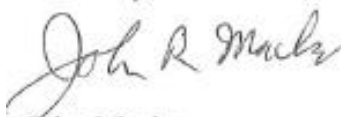
With the ever changing nature of the technology world, it is important that NTID Technical programs keep pace with what employers are seeking in skill level of college graduates. The Mobile Design and Development program will enhance NCE's opportunity to attract employers seeking our students and graduates for both co-op and full-time positions.

In addition, we are finding that more students considering NTID for their college degree are expecting to subsequently graduate with a BS degree. With a certain percentage of these students not fully academically ready for the BS level, the AAS degree program will allow them to strengthen their skills and be better prepared in two years to move into the BS degree programs.

NCE has continuously developed good working relationships with faculty from the Information and Computing Studies department, so we are fully prepared to assist the students as they complete the AAS degree and work with them as they seek entry level jobs or they enter their BS degree program.

We look forward to working with the Information and Computing Studies department on this new AAS degree program.

Sincerely,

John Macko
Director, NCE

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14. **Rochester Institute of Technology**

Daniel Bogaard
Department of Information Technology
102 Lomb Memorial Drive
Rochester, New York 14623-5608
dsb@it.rit.edu • 585-475-5231

David Lawrence   October 21, 2014
Information and Computing Studies
National Technical Institute for the Deaf

Dear Dave -

At the Advisory Board meeting I had the opportunity to review the program mask and course descriptions and can say that at least some of the technical courses will be able to transfer for credit towards a BS level degree in our department. Once the program gets fully approved and I have the opportunity to see the complete syllabi, we can meet again to review course transferability and draft an articulation agreement.

I will support students in the Mobile App Development Program choosing to take either ISTE-140 or ISTE-200 or ISTE-230 as their technical elective in the third year.

Sincerely,

Daniel Bogaard
Associate Professor
Undergraduate Program Coordinator

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Rochester Institute of Technology

Rochester Institute of Technology
Center for Media, Art, Games, Interactivity and Creativity (MAGIC)
159 Lomb Memorial Drive (CSI-1673)
Rochester, NY 14623
585-475-6464
magic.rit.edu

2/20/14

David Lawrence
Information and Computing Studies
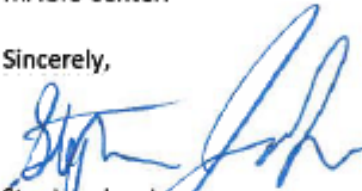National Technical Institute for the Deaf

Dear David

I am writing in support of NTID's proposed AAS in **Mobile Application Design and Development**. Due to my work with MAGIC's Mobile Zone initiative and in the Department of Interactive Games and Media I am conversant with the current state of the art in terms of current mobile development, right up to the work we've done in the last month or two to launch the AT & T Civic App Challenge today.

As a former adjunct in NTID's department of Applied Computing Technology (the predecessor to ITS) and throughout my career as an RIT faculty member I have taught and/or mentored Deaf computing students My most recent mentees are Motion Savvy team who are now funded members of the Leap Motion AXLR8R program and presenting at the AAS Emerging Researchers National Conference in STEM next week. I'll be joining the team and Dr. Buckley when they present to CISCO in San Jose in March.

The mobile development world is one of the most vibrant sectors of computing today and its great to see the curriculum your department has developed. I believe it will provide them with a solid, foundational understanding of the different aspects of design required for mobile development and give them the skills they need to develop on their own and/or move into the IST BS program.

Congratulations on a solid effort and I look forward to seeing your students engaging with us in the MAGIC Center.

Sincerely,

Stephen Jacobs
Associate Director, RIT Center for Media, Arts, Games, Interaction & Creativity (MAGIC)
Professor, Interactive Games and Media
Rochester Institute of Technology
152 Lomb Memorial Drive
Bldg 70
Rochester, NY 14623
sj@mail.rit.edu
585-278-6118. Cell

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Rochester Institute of Technology

Stephen J. Zilora
Associate Professor and Chair
Department of Information Sciences & Technologies
(585) 475-7643   Fax: (585) 475-2181
Email: steve.zilora@rit.edu

October 21, 2014

David Lawrence
Information and Computing Studies
National Technical Institute for the Deaf

Dear Dave,

I am writing in support of NTID's proposed AAS in **Mobile Application Design and Development**. Here in the Information Sciences and Technologies department we are seeing explosive growth in student interest in our mobile application development courses. This interest is driven not only by the natural affinity young people have with the mobile world, but also by the increasing demand for mobile application developers by employers. It is great to see you seizing the opportunity to provide this education for your students as well.

In reviewing your proposed curriculum, I can say that I believe you will be doing a very good job preparing your students for employment as well as preparing them to continue their studies with a BS in Information Technology should they so choose.

I look forward to our continued work together to provide the best possible opportunities for all our students. Please let me know if I can be of any additional help in getting this degree up and running.

Sincerely,

Prof. Stephen J. Zilora
Information Sciences and Technologies Department Chair

Memorandum

TO: David Lawrence, Instructional/Support Faculty, Information and Computing Studies
        Elissa Olsen, Chair, Information and Computing Studies,
        Myra Pelz, Instructional/Support Faculty, Information and Computing Studies
        Brian Tager, Instructional/Support Faculty, Information and Computing Studies

CC: Shirley Bower, Director, RIT Libraries
        Sheila Smokey, Manager, Acquisitions & Serials

FROM: Joan Naturale, NTID Librarian, RIT Libraries
DATE: October 16, 2014
RE: Library support for proposed Mobile App Design and Development Associate Degree Program

The following outlines the impact of NTID's Department Information and Computing Studies proposed Associate's degree program in Mobile App Design and Development.

This program will have a minimal impact on the library's services and collection of books, journals, and databases.

RIT Libraries now use a demand/user-driven model of acquisition for the majority of its book purchases, ensuring books purchased are those that users want.

Our current holdings (journals and databases) are at acceptable levels for associates' level programs. This is based on requests for books not published yet and new journal titles.

The Wallace library's **Computer Science and Information Technology collection of journals, books, and databases** supports the associate degree programs for the technical and design aspects of Mobile App Design and Development. There is a librarian content specialist for this content area (Roman Koshykar) and he works closely with Golisano College, ensuring the collection is up-to-date. His LibGuides on various computer-related topics can be accessed via this link: http://infoguides.rit.edu/cat.php?cid=32386

The library subscribes to **standard core collections of Computer Science and Information Technology databases and books** by professional associations and publishers for example, ACM Digital Library, Synthesis Digital Library, Books24X7, Science Direct, Springer Link, Ebrary, and other databases found at this link:
http://library.rit.edu/dbfinder/index.php?query=*%3A*&fq[]=subject:%22Computer+Science+%2F+Information+Technology%22

There is a strong collection of both print and e-books on this topic particularly if one uses the terms mobile apps, IOS programming, Android programming and related terms when searching the RIT Libraries Catalog via http://albert.rit.edu/

The Wallace library is a member of the Rochester Regional Library Council (RRLC), which provides RIT students, researchers, and faculty access to materials at other Monroe County libraries, using free **RRLC Library access cards**. Requested journal articles and books not owned by the Wallace Library will be obtained on a timely basis through the library's **interlibrary loan and document delivery services (IDS)** and **ConnectNY.**

October 31, 2014

Mr. David Lawrence, Faculty
NTID Information & Computing Studies

Dear Dave,

The AAS degree proposal for Mobile App Development would be very efficiently served by Access Services. As you know, Writing courses are normally taught by NTID faculty without use of access services. The remaining credits of 'perspectives courses' would be require little additional resources to support because these classes are heavily enrolled by deaf students already. Added students would most often be served within existing supported sections of these lower division classes. Lower division courses are generally larger and hold higher numbers of deaf students, making them a relatively good bargain for service efficiency.

The perspective courses students take would apply within the proposed ASS degree and fill requirements for those students who move on to BS level programs at RIT. With increasing enrollments in RIT sections DAS, will see a small increase in resource requirements but this is impossible to quantify. We have been seeing slow, consistent growth over our entire history mapped to the increasing success of NTID-supported students in RIT majors. This proposal would fit comfortably within that trend.

We certainly support increased opportunities for deaf students to undertake studies in new areas, especially when the curriculum design does not place extraordinary burdens on Access Services. Having deaf students in NTID programs become acquainted with requesting and effectively using access services while in their AAS program seems a great way to prepare them for higher levels of study at RIT should they choose to pursue that option.   Access Services is in support of your proposal.

Steve Nelson

Stephen A. Nelson
Director of Operations, Access Services
National Technical Institute for the Deaf

Rochester Institute of Technology
(585) 475-6455 (office)
(585) 797-4007 (cell)
Steve.Nelson@rit.edu

XC: Dr. Richard Peterson, Assistant Dean and Director
        Ms. Elissa Olsen, Information & Computing Studies Chair

R·I·T

November 17, 2014

Dr. Dawn Hollenbeck
Associate Professor and Chair
Inter-College Curriculum Committee
College of Science
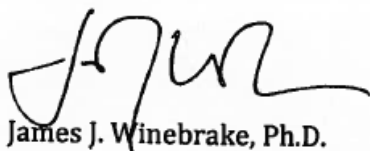
Dear Dr. Hollenbeck,

I write in support of the proposal for an Associate of Applied Science (AAS) degree in Mobile Applications Development (MAD) submitted by the National Technical Institute for the Deaf (NTID).

As the degree proposal has developed, the program development team at NTID has kept us abreast of the general education demands that the AAS will bring to bear on the College of Liberal Arts. Having reviewed the cost model, I am comfortable supporting this curricular opportunity and initiative created by our colleagues in NTID.

The Dean's Office in the College of Liberal Arts is supporting this proposal with the understanding that the incremental resources associated with the liberal arts general education requirements of the degree will be allocated to the operating budget of the College of Liberal Arts.

Sincerely,

James J. Winebrake, Ph.D.
Dean

cc: Gerard Buckley, President of NTID

Appendix D – Program Need and Marketability

A. *Program Demand and Fit with Student Skills*

Due to the explosive growth in the use of mobile devices to access and use the Internet, there's been a boom in the field of mobile application (app) development. In 2012, deployment and use of mobile applications created a $53 billion economy and by 2016, it is expected to rise to $143 billion.[7] Additionally, by 2016, the global app economy is expected to account for 33% of the combined app services and handset market (up from 18% in 2012) which is an indication that the number of apps will continue to grow and outpace the value of handsets on a yearly basis.[8]

As smart phones, smart things, tablets and wearable devices continue to change the way we communicate, do business and access news & entertainment, the demand for new and innovative mobile apps is growing at an incredible speed. This increased demand translates to one of the largest IT skills gaps ever realized – there are simply more mobile app development job openings than skilled application developers to fill them.[9]

According to an article published by the Online Learning Consortium, "Mobile Apps are the fastest growing dimension of the mobile space in higher education right now, with impacts on virtually every aspect of informal life, and increasingly, every discipline in the university."[10]

For two years, the ICS department in NTID has been offering a special topics course called "Windows Phone App Development". Each time the course has been offered, we have achieved maximum class enrollment. Most of the students taking the course are either currently or formerly in one of ICS' associate degree programs.

In the spring of 2014, the ICS department conducted a one-question clipboard survey for all students in the ICS department to gauge student interest in a program focusing on mobile app development. The question posed was, "If a program that teaches how to create apps on mobile devices (smartphones, tablets, etc.) were offered when you came to NTID, would you have considered applying to this program?" The results were profound. Of 51 respondents, 45 answered "Yes".

Based on the app development course we offered, the student survey we conducted, program awareness through potential HS dual credit offerings and the natural affinity young people have for mobile devices, we anticipate this will be a popular program and one in which students can succeed.

B. *RIT Rationale for the Program*

RIT values NTID students and looks to them to make unique and innovative contributions to RIT's academic community. President Destler, in his 2009 Address to the Institute, states that "NTID is one of the crown jewels of RIT, and we must do all we

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[7] Godfrey , Jonathan and Reed III, Morgan. "App Store after Five Years." ACT: The App Association, 19 July 2013
[8] Christina Voskoglou. "App Economy Forecasts. 2013-2016" DE: Developer Economics. 17 July 2013.
[9] Greenspan, Daniel. "IT Career Paths." IT Career Finder, July 2014.
[10] http://onlinelearningconsortium.org/institute/asynchronous-workshop/2014/10/24/introduction-mobile-apps-and-tablets

can to take advantage of opportunities that the presence of this college on our campus provides".

From the RIT Strategic plan and its mission statement: "Our mission is to provide technology-based education tracks for personal and professional development. We rigorously pursue **new and emerging career areas**. We develop and deliver curricula and advance scholarship relevant to emerging technologies and social conditions." This program addresses the new and rapidly growing market of mobile application development and use.

C. *Graduate Marketability*

ITCareerFinder, an on-line portal for helping IT professionals advance their careers, assembled a comparison of the decade's hottest technology careers. These careers will experience the fastest growth through 2020, pay salaries well above the national average, boast top employment, and offer a range of advancement opportunities.[11] The Mobile Application Developer position was highlighted as being the best computer career for the future. The Bureau of Labor Statistics predicts that the number of Computer Software Programmer jobs will grow by 28% (much faster than average) from 2010 to 2020 and that mobile app developers will have approximately 82,000 jobs for associate degree holders during that period.[12]

In a letter from John Macko, Director of the NTID Center on Employment, he says *"With the ever changing nature of the technology world, it is important that NTID Technical programs keep pace with what employers are seeking in skill level of college graduates. The Mobile Design and Development program will enhance NCE's opportunity to attract employers seeking our students and graduates for both co-op and full-time positions."*

D. *Input by External Partners*

In September, 2014 the ICS department assembled a Curriculum Advisory Board to review the proposed Mobile App Development program. This board was comprised of nine representatives from the mobile computing Industry, three individuals from RIT BS level programs with strong knowledge of mobile app development, two from an out-of-state community college with a degree program in mobile app development and an NTID employment advisor.

The members of the Curriculum Advisory Board are shown below.

Name	Title	Organization
Craig Lamb	Partner and CIO	Envative
David Mastrella	Partner and Chief Architect	Envative
Todd Bernhard	CEO	No Tie Software
Steve Maier	Senior Technical Evangelist	Microsoft
Ian Caspersson	President	IC9 Design
Mark Navarra	Recruiting Manager	Wellington Steele and Associates
R. John Gaudu	VP and Founding Partner	Wellington Steele and Associates
Paul Solt	CEO	Artwork Evolution

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[11] Greenspan, Daniel. "IT Career Paths." IT Career Finder, July 2014.

[12] Bureau of Labor Statistics. Occupational Outlook Handbook. < http://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm> Retrieved 1 Oct 2014.

Jesse Black	Software Consultant	Self-Employed
Dr. Larry Ray	Program Chair	Stark State College, Canton, Ohio
Sharon Hoover	Instructor	Stark State College, Canton, Ohio
Bryan French	Lecturer	GCCIS/RIT
Dan Bogaard	Associate Professor	GCCIS/RIT
Anthony Jefferson	Senior Lecturer	GCCIS/RIT
Regina Kiperman-Kiselgof	Senior Employment Advisor	NTID/RIT

In the meeting, we reviewed our planned program curriculum and courses in detail. Feedback varied based on the needs represented by that advisor, but in general their feedback was helpful and resulted in some changes to the curriculum.

Based on their feedback, removed a second Web course we had planned in the second semester of the first year. Most of the members felt that we were overstretching the scope of the program as it related to web. Several of the advisory board members expressed the need for good fundamentals in programming for employers and this sparked the creation of a new course called Software Analysis and Design. This course will focus on refining and strengthening the fundamentals of programming that will lead to a greater understanding of app development.

Other feedback caused us to tweak some course content, but not change the course itself.

There were other feedback that we gathered where one advisory board member wanted to see more programming and another wanted to see more mobile web. Some of them admitted that they had the ideal candidate in mind, but that it would only fit into their business model. Rather than modifying the program to be address a specific niche in the field, we decided to keep the program's goal of developing a broad set of skills that will easily adapt into various niches in the app development industry. One board member stated, *"I would hire somebody out of this curriculum without thought actually if the person could come and present themselves with good communications skills and had some examples of work they have done. This is actually the type of person we're looking for that's -- I'm looking for more of a well-rounded person than an expert in one area. This curriculum actually excites me, what you're doing here."*

The qualifications of the Advisory Board members

Todd Bernhard,
> CEO
> No Tie Software - NoTie.NET.
> Mr. Bernhard is an award-winning, bestselling App Developer specializing in accessibility apps including AllAccess.US, AutoVerbal and AutoRingtone. He is cofounder of AppRochester.com, AllAccess.US, and FlixAcademy.com and Contributing Editor for iPhone Life Magazine.
> FlixAcademy.com - Watch. And Learn. Winner, 2014 Rochester Startup Weekend, AllAccess.US -Making Businesses More Accessible! Winner, 2012 Rochester Startup Weekend, 2013 Digital Rochester Rising Star, NoTie.NET - AutoVerbal Talking Soundboard (AARP Silvers Summit Award) & AutoRingtone Custom Text-To-Speech CallerID Ringtones (Winner, About.com, BestAppEver.com), iPhone Life Magazine Contributing Editor

Jesse Black
> Graduate of RIT's CS department. Currently self-employed as a software development consultant with expertise in web applications and iOS and Android mobile application development

Daniel Bogaard
> Associate Professor
> Undergraduate Program Coordinator
> Information Sciences and Technologies Department
> Golisano College of Computing and Information Sciences
> Courses Taught: ISTE-140 Web & Mobile I, ISTE-240 Web & Mobile II, ISTE-340 Client Programming, ISTE-341 Server Programming, ISTE-442 Web Application Development
> Consulting: Advance NSF Study, Rochester General Hospital – AOM Study, Emergency Services Directory
> Grants:
> The Emergency Services Directory of STEP, $127,500
> NTHi Immunity in Young Children, Rochester General Hospital Health Systems, $16,059
> Acute Otitis Media Database Project, Rochester General Hospital, $18,000
> Speech to Text Systems: Comparative Analysis of Text Generation and Display Methods, NSF Award, $269,542.
> Awards: Eisenhart Outstanding Teaching Award, Rochester Institute of Technology, 2012

Ian Caspersson
> President
> IC9design, Inc.
> IC9design is a creative and technical web services company. We focus on developing web technologies into business solutions. Our business is in a constant state of evolution due to the ever evolving advancements in how people interact with devices, manipulate open-source software, and fine tune their virtual environments to fit their personal needs.

Bryan French
> Lecturer
> Department of Information Sciences and Technologies
> Golisano College of Computing and Information Sciences
> Rochester Institute of Technology
> I teach Web and mobile app design and development as well as do mobile app development for myself and other companies.

R. John Gaudu
> Vice President and Founding Partner
> Wellington Steele & Associates, Inc.
> Life-Long Learner with an Entrepreneurial Spirit. My 25+ year career has granted me the opportunity to understand the needs and requirements in both the public and private sectors of the Information Technology arena. I place a premium on establishing long term, trusted and mutually beneficial partnerships. These partnerships have afforded me the experience and insight necessary to deploy comprehensive and cost effective IT and human resource solutions for my clients. I have been fortunate enough to have led highly skilled teams from the concept & design phase through deployment and into ongoing support. Recently the bulk of my work has involved extensive outsource support for Application Development, Database Administration and Project Management for a wide variety of "Big Data" and "Cloud" solutions.

Specialties: My expertise is the design of complex infrastructure solutions. I have acquired detailed knowledge of both wired and wireless infrastructures, data center design, VoIP integration, application development with ongoing human resource support for the same.

Sharon Hoover

Instructor of Computer Science
Programs Coordinator, CSIS Department
Stark State College, North Canton, Ohio
Sharon Hoover is an Instructor of Computer Science at Stark State College. She has been employed with Stark State since 2011 and teaches a range of programming courses.   Her most recent assignments have included technologies and programming languages such as Java, SQL Server, Android development and C# for Windows Phone. Prior to joining Stark State, she worked as a Software Developer/Analyst for 10+ years in the fields of healthcare and court case management.

Anthony Jefferson

Senior Lecturer
Department of Interactive Games and Media
Golisano College of Computing and Information Sciences
Rochester Institute of Technology
I have been teaching at RIT since 2003 in the web and mobile application areas.

Regina Kiperman-Kiselgof

Senior Employment Advisor
Center on Employment (NCE)
NTID
I assist deaf and hard of hearing students with their employment searches in fields such as Applied Computer Technology and Information Technology. I teach courses related to job search processes, help students develop their interviewing skills, advise them about employment trends and coach them on finding co-op/internship opportunities. I develop and enhance employment opportunities for deaf and hard-of-hearing students and graduates of RIT. I travel a lot and conduct employer training workshop "Working Together: Deaf and Hearing People" regarding accommodations and integration in the workplace. I also work with the staff and faculty of the colleges and share job trends.

Craig Lamb

Partner and Chief Information Officer
Envative
Craig is responsible for supporting current, and researching new technologies that are leveraged in the company's custom development efforts. Envative is a development firm focusing on web- based and mobile solutions and technologies for business to business, and business to consumer opportunities. Solution sizes range from simple dynamic web applications to Enterprise, organizational- wide, applications.
He was named chief information officer in January 2005 after serving as head developer for a number of years. As a result of Envative's growth, the company was restructured and the chief information officer necessity emerged and Craig's past experience made him an obvious choice for the position.
Craig is also Envative's mouthpiece and specializes in technical demonstrations including sales presentations and educational technical discussions.
He earned his bachelor's degree in Communications from St. John Fisher College and several Continued Education and Software Development Language certifications from RIT.
Craig has worked on projects with British Telecom, Olympus, Leukemia & Lymphoma Society, The Andrew Mellon Foundation, Sirius Software, and Bagport Worldwide.

Steve Maier

Senior Technical Evangelist

Microsoft

We build experiences for your life

I have personally published 11 iOS apps, 2 Android apps, 11 Windows Phone apps, 6 Windows 8 apps and I have the ear of the Accessibility group at Microsoft for our operating systems and phones. This means that we have some great things to help people with disabilities.

David Mastrella

Partner and Chief Architect

Envative

David has been immersed Internet based application design & development for the past 13 years – with total development experience exceeding 20 years. He has held positions ranging from senior developer, systems manager, IT manager and technical consultant for a range of businesses across the country. David has been the integral in the growth of Envative as a partner and one of the chief architects of our antitexting mobile application; which is patent-pending.

David's strength comes from a deep knowledge of Internet technologies, design, project management skills and a rapid learning ability. He can communicate technical information effectively to non- technical people, and conversely translate ideas into both highly creative and efficient technical solutions.

David is responsible for all resource assignments and coordination of the engineers at Envative.

Dave holds a degree in Computer Science from Brockport University and an MBA from the Simon School.

Mark Navarra

Recruiting Manager

Wellington Steele & Associates, Inc.

Started in IT back in 1984 at Eastman Kodak as a VAX/VMS Systems Manager. He progressed up the IT infrastructure stack from a Novell Certified Network Engineer to a Microsoft Certified Systems Engineer.

As an IT consultant, Mark has worked for clients from NYC to North Carolina. He began working in IT Staffing in 2000 and continues to this day as the Recruiting Manager for Wellington Steele and Associates in Rochester. His background in IT gives him a unique perspective on the technical as well as the business side of IT Consulting.

Paul Solt

CEO

Artwork Evolution

We are a creative development studio that builds iPhone apps and teaches our secrets through online iPhone app programming and design courses.

Dr. Larry Ray

Associate Professor and Department Chair of Computer Science and Information Systems

Stark State College, North Canton, Ohio

Dr. Ray has been employed with Stark State College since 2000, after spending close to 20 years in the computer industry at various organizations. Stark State College is a comprehensive community college with transferable higher education and career development programs. The College offers more than 230 associate degrees, options, one-year and career enhancement certificates in business and entrepreneurial studies, education,

engineering technologies, health and human services, information technologies, liberal arts, mathematics and sciences. Stark State College has around 15,000 students enrolled that are seeking degrees, certificates, or professional development.

E. External Letters of Support

Steve Maier, Senior Tech Evangelist	Microsoft Corp.
Ian Caspersson, President	IC9 Design, Inc.
Mark Navarra, Recruiting Manager	Wellington Steele & Associates, Inc.
R. John Gaudu, Vice President	Wellington Steele & Associates, Inc.
Craig Lamb, Partner and CIO	Envative

Microsoft

David Lawrence   Steve Maier
NTID   Senior Technical Evangelist
Rochester Institute of Technology   Microsoft
October 3, 2014

Dear David Lawrence:

I am happy to be a part of the advisory board for the new Mobile App Design and Development degree that is being planned. Microsoft likes to work with schools on new degrees like this to help give their feedback and share what we look for in the industry and what we have available.

I think that you have planned out has been well thought out and fits well into the market today and in the future. More and more apps are moving in a cross platform direction and introducing the students to this in the degree will definitely benefit them. This way a student could focus on a single platform later or be useful for any platform.

I like your plans to use Xamarin and C# as the method of delivering this content to the students. I have contacted the Vice President of Xamarin, Joseph Hill, and he is willing to work with the school and the instructors on the use of their software. I will try to introduce the people from this degree program to Joseph at the Evolve 2014 conference next week.

I also have been using Xamarin tools for about 5 years and will volunteer to help train and be an industry resource for the faculty to learn the tools and become proficient with them. I am on campus teaching in the Interactive Gaming and Media department three days a week and would not mind helping to go over all of the tools and how to use them.

I am also going to look to get the program some Windows Phones for the students to use. Microsoft donates things like this to schools all the time and I will work with our teams to get devices for this. We will do this closer to the launch of the program to get the latest phones for the students to use. I cannot speak for other phone developers, but I do know that Apple is getting more involved in education and might do the same right as the program starts.

Feel free to contact me for assistance with Xamarin or anything mobile as I also run the AppRochester mobile development community group. We are in our fourth year of existence and welcome new people.

Sincerely,
Steve Maier
steve.maier@microsoft.com
585-330-2598

Dear David,

Thank you for allowing me to be part of the Advisory Board for the planned Mobile App Design and Development program.

After reviewing the planned program mask, course descriptions and general plans for the program, I believe the plan is sound and will have a successful future for students interested in creating applications for mobile devices. The minor revisions to the program and courses that were recommended by the Advisory Board would make the program even stronger and we are hoping you will consider them.

I would be happy to consider a partnership with you so that faculty could come to our facility and experience what we do and how we do it. The capstone course you are planning is also an interesting concept and we would be willing to work with students on projects of interest to us to help them develop their skills. The app industry is ever-evolving and it is worth making note that you ensure the curriculum instruction adjusts as needed throughout the years to keep up with advancements in technology and web services.

If students complete your program with the skills intended, IC9design, Inc. would seriously consider co-op or full time employment for them.

Sincerely,

Ian Caspersson
President
IC9design, Inc.

office: 585.657.6379
toll free: 800.964.6299
website: http://www.ic9design.com

Real. Responsive. Websites. Learn More

David,
Just a quick note to say how valuable we think the MADD program could be for us as a recruiting agency.

RIT is one of the few colleges in the area that "grow" qualified software/mobile application developers/engineers and we would certainly recruite people from the MADD program.

Thank you

Mark G. Navarra

Recruiting Manager
Wellington Steele & Associates, Inc.
720 East Ave
Rochester, NY 14607
Office: 585-360-4350
Mobile: 585-905-8812
mnavarra@wellingtonsteele.com
Proud to be named a Rochester Top 100 Company for 2012 & 2013

Wellington Steele & Associates Inc.
720 East Ave
Rochester NY 14607
Tel 585.360.4350 Fax 585.360.4335
rjgaudu@wellingtonsteele.com
www.wellingtonsteele.com

OCTOBER 6, 2014

Hi David:

I just wanted to take a moment to say thank you for inviting Wellington Steele & Associates Inc. to take part in the curriculum review and planning session for your Mobility Applications Design and Development course. As a software development and outsource company here in town I can tell you our needs for these types of graduates has never been higher. Our placements in the App/Dev arena have double each year for the past three years we sincerely hope that the trend continues.

Keep up the great work. I hope to be placing these gifted young graduates with our clients and associates in the near future!

Regards,

R. John Gaudu

EVP, Wellington Steele & Associates, Inc.

envative
web · mobile · data

October 3, 2014

Elissa Olsen
Department Chair
RIT/National Technical Institute for the Deaf
52 Lomb Memorial Drive
Rochester, NY 14623

Dear Elissa,

David and I wanted to take a moment to thank you for including us as members of the Advisory Board for the planned Mobile App Design and Development program.

We were both impressed with the diligence and considerations outlined in the planned program mask and course descriptions. We believe the program is sound and would be excited to participate in a CoOp program and eventually employ students from this program. The minor revisions to the program and courses that were recommended by the Advisory Board would make the program even stronger and we are hoping you will consider them. We would be happy to consider a partnership with you so that faculty could come to our facility and experience what we do and how we do it. The capstone course you are planning is also an interesting concept and we would be willing to work with students on projects of interest to us to help them develop their skills.

Again, David and I are honored to be included in this important program.

Sincerely,

Craig Lamb
Partner

Cc: DMM

Appendix E – Space Allocation/Renovation Request

Space

With the additional 12 students per year, and the addition of 11 new technical courses to the ICS portfolio of courses, lecture and lab space will be impacted. There is a pending 2015 move of the ICS department from HLC building to the LBJ building. In the most recent design there is an (approximate) 450 sq. ft. lab designated for the Mobile Application Development lab if the program is approved. Before the Mobile Application Development program is implemented (or in the case the program is not approved), the lab will be used for the ACT Technical Capstone course.

The lab will be equipped with sufficient benches, electrical capacity, internet connections, and computers for use as either the capstone lab or the Mobile Application Development lab.

Two classrooms are part of the space designs for the ICS department in LBJ. In addition, there are other classrooms throughout LBJ that can be used if needed. These classrooms, along with the available lab space will be sufficient to meet the needs of our current programs and this Mobile Application Development program.

See the note from Erwin Smith, NTID Assistant Vice President for Information Technology and College Operations dated 10/24/14 on the next page.

From: Erwin J. Smith
Sent: Friday, October 24, 2014 9:31 AM
To: David Lawrence
Cc: Elissa Olsen; Stephen Aldersley
Subject: Space requirements for the Mobile Application Device program

Ms. Elissa Olsen,

NTID is renovating nearly 9,000 sq. ft. in LBJ Hall to support the Information Computing Studies programs. Approximately 450 sq. ft. on the 1st floor of LBJ Hall will be allocated to the proposed Mobile Application Device (MAD) program. NTID is working with FMS and HBT Architects to finalize the design and construction schedule. Construction is planned to begin in December 2014 and expected to be completed by mid-summer 2015, in time to support classes for the Fall 2015 semester.

If additional information is required, please don't hesitate to contact me.

Sincerely,

Erwin J. Smith

Assistant Vice President, Information Technology and College Operations
National Technical Institute for the Deaf
Rochester Institute of Technology
Lyndon Baines Johnson Bldg. 60-2631
52 Lomb Memorial Drive
Rochester, NY 14623-5604

Phone: 585.475.6224 (V/TTY)
Fax: 585.475.7410
Email: erwin.smith@rit.edu

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Appendix F – Faculty Curricula Vitae

The following pages contain the Curricula Vitae for the following faculty:

Elissa Olsen
Karen Beiter
Chris Campbell
Raja Kushalnagar
Joseph Stanislow
Brian Trager

<div align="center">

Curriculum Vitae

Elissa M. Olsen

Rochester Institute of Technology
National Technical Institute for the Deaf
Information and Computing Studies Department
96 Lomb Memorial Drive
Rochester, NY 14623
Elissa.Olsen@rit.edu - 585-286-4639

</div>

Formal Education

M.S., Software Development and Management, Rochester Institute of Technology	1999
B.S., Computer Systems, Rochester Institute of Technology	1980
A.A.S., Data Processing, National Technical Institute for the Deaf	1978

Professional Employment History

1993-Present   Rochester Institute of Technology
National Technical Institute for the Deaf
Rochester, NY 14623

2002-present   Administrative Chairperson: Manager of an academic department consisting of fourteen full-time faculty and two staff positions. Department student enrollment is approximately 150. Responsible for coordinating all academic matters including instruction, advising, scheduling, curriculum, student records, student admissions and academic actions. Also responsible for maintaining the department budget, monitoring the plan of work (POWs) and appraisals for all department faculty/staff, and managing the department facilities and inventory control of hardware and software.

1993-2002   Teaching Faculty: Teach and develop a variety of courses offered by Applied Computer Technology department. Courses include: Logic and Problem Solving, Introduction to Business Programming, Application Software, PC Hardware I, PC Hardware II, Spreadsheet Software, Career Exploration in Applied Computer Technology, Employment Seminar, Internet Technologies, World of Work, etc.

1998-2002   Department Coordinator: Assisted department chair with various departmental tasks, including evaluating student coop experience and assigning final grades, performing degree audit certifications for students graduating each term and representing the department during the absence of the chairperson at center meetings and numerous other requests made by the chairperson.

1980-1993   Electronic Data System
1000 Lexington Avenue
Rochester, NY 14606
Systems Programmer: Supported AC Rochester Materials Management Systems division. Maintained the Production, Scheduling, Inventory and

Control (PSIC) computer system. Performed current situation analysis, construction, unit testing, implementation and production support. Work responsibilities included:

- Implementing Electronic Data Interchange (EDI) capability for data transmission to other sites. Standardized deliverables, performed work analysis using data modeling techniques.
- Constructing unit testing and implemented the engineering systems in Burroughs operating environment.
- Coordinating the automated disaster recovery plan using the Data Management System utilities and executed the simulation of recovering plan for the system's 1,800 jobs.
- Assisting with the implementation of the system by installing interface programs to extract data from Xerox Sigma 9 system to IBM environment. Performed estimates, analysis, definition, design, construction, testing and implementation of various phases of manufacturing and financial programs.

Tenure and Promotion

Awarded Tenure, National Technical Institute for the Deaf at Rochester Institute of Technology, 2003-2004 academic year

Promoted to Assistant Professor, National Technical Institute for the Deaf at Rochester Institute of Technology, 2001-2002 academic year

Teaching and Professional Certifications

Sign Language Proficiency Interview (SLPI): Advanced Plus to Superior Plus

Scholarship and Related Activities

A Transition Community for Deaf and Hard of Hearing (DHH) Students in Information Technology Programs by Raja S. Kushalnagar, David E. Lawrence, and Elissa M. Olsen. In 13th Annual ACM SIGITE Conf. Inf. Technology. Education - SIGITE '13, page 143, New York, New York, USA, October 2013. ACM Press. ISBN 9781450322393. doi: 10.1145/2512276.2512319

Institute Committee served (selected):
- Sign Language Proficiency Interview (SLPI) team member (interviewer and rater)
- Academic Integrity Committee representative
- NTID Curriculum Committee
- Tenure Committee
- Promotion Committee
- The Edmund Lyon Memorial Lectureship
- Alpha Sigma Theta Sorority Advisor
- RIT's Distinguished Alumni Award Selection Committee
- Instructional Technology Consortium Committee
- NTID's Outstanding Scholarship Committee
- Computerized Early Alert System

Karen J. Beiter

Rochester Institute of Technology
National Technical Institute for the Deaf
Information and Computing Studies Department
96 Lomb Memorial Drive
Rochester, NY 14623-5604
(585) 286-4546 • Karen.Beiter@rit.edu

Education

M.S., Computer Science, Rochester Institute of Technology	**1994**
B.S., Computer Science, Rochester Institute of Technology	**1988**

Career: Teaching

Program Coordinator	Rochester Institute of Technology, Rochester, NY	2011- now
Assistant Professor	Rochester Institute of Technology, Rochester, NY	2003- now
Instructor	Rochester Institute of Technology, Rochester, NY	2001-2003
Visiting Instructor	Rochester Institute of Technology, Rochester, NY	1998-2001
Adjunct Instructor	Rochester Institute of Technology, Rochester, NY	1993-1998

Career: Industrial Experience

Computer Systems Analyst	Eastman Kodak, Enterprise Resource Program Rochester, NY	1997-1998
Business/Computer Systems Analyst	Eastman Kodak, Global Parts System Department Rochester, NY	1993-1997
Computer Systems Analyst	Eastman Kodak, International SCAN 1/IMOS Support Rochester, NY	1987-1993

Teaching/Tutoring Experience

Teaching:
NCAR 100 – Freshman Seminar
NACT 120 – Intro to Computer Applications
NACT 230 – Intro to Programming
0805-201 – Applications Software
0805-205 – Intro to Midrange Computer Operations
0805-206 – Command Language/Utilities for Midrange Computers
0805-207 – Multiprogramming & Spooling for Midrange Computers
0805-211 – Web Development for Business

0805-218 – PC Operating Systems

0805-220 – Intro to UNIX (for AS students)

0805-220 – Intro to UNIX (for AOS/AAS students)

0805-230 – Intro to Programming (formerly Programming I)

0805-231 – Programming II

0805-251 – Intro to Web Development (formerly Web Development I)

0805-252 – Web Applications (formerly Web Development II)

0805-305 – Spreadsheet Software

0805-310 – Microcomputer Database

0805-320 – Client Side Scripting

0805-323 – Advanced Web Development

0805-340 – Visual Programming Language I

0805-341 – Visual Programming Language II

0805-398 – Special Topics: Intro to Multimedia Using Flash

0805-398 – Introduction to Linux

0805-398 – Introduction to JavaScript

0805-398 – PHP Programming

0806-201 – Employment Seminar

Teaching Support:

CSCI 141 – Computer Science I

ISTE 120 – Computational Problem Solving in the Information Domain I

ISTE 121 – Computational Problem Solving in the Information Domain II

ISTE 230 – Intro to Database & Data Modeling

ISTE 608 – DB Design & Implementation

MAAT 306 – Cross Medial Publishing

MGIS 350 – Developing Business Applications

MGIS 320 – Database Management Systems

PHPS 315 – Web Publishing

VCDE 723 – Interaction Design

4002-217 – Programming for Info Tech I

4002-218 – Programming for Info Tech II

4002-219 – Programming for Info Tech III

4002-206 – Web Foundations

4002-320 – Intro to Multimedia

4002-360 – Intro to Dbase and Data Modeling

0806-101 – Job Search

Project Fast Forward Dual Credit Consultant Teaching:

0805-201 – Applications Software

0805-251 – Intro to Web Development
(Visited several schools across the USA to meet with high school instructors and students)

Summer Youth Camps:
Explore Your Future – Discovering your areas of technical skills using LEGO robotics
TechGirlz/TechBoyz – Build Your Own PC, Web Development, Movie Maker
DRobotz – Enriching your math skills with LEGO Robotics and Programming
Summer Vestibule Program – Sampling careers for incoming freshmen

Curriculum Development

New Semester Courses:
NACT-120 – Computer Applications
NACT-170 – Intro to Web Development

New Special Topics Courses:
0805-398 – Introduction to Linux
0805-398 – Introduction to JavaScript
0805-398 – PHP Programming
0805-398 – Intro to Multimedia Using Flash

Program Coordinator Experience

Administrative Tasks:
Chaired the curriculum development conversion from the quarter to semester system
Managed the student coop program
Scheduled quarterly and semester courses
Assigned faculty courses/workloads
Chaired search committees
Coordinated the Summer Vestibule Program
Organized department level student meetings
Helped manage the Program Outcomes Assessment
Hired and scheduled Peer Tutors
Updated the ICS department handbook
Wrote letters of recommendations for scholarships and job positions
Led several prospective student tours

Research Experience

Refereed Proceedings:
1. KUSHALNAGAR, R. S., TRAGER, B. P., AND BEITER, K. B., Accessible Viewing Device.
   In *Convention of American Instructors of the Deaf.* (Rochester, NY, 2013).

2. KUSHALNAGAR, R. S., TRAGER, B. P., AND BEITER, K. B., American Sign Language: Maximum Live Replay Speed. In *Rehabilitation Engineering and Assistive Technology Society of North America.* (Seattle, WA, 2013), RESNA.

3. KUSHALNAGAR, R. S., TRAGER, B. P., AND BEITER, K. B., Assistive Review Replay for Deaf Students. In *Proceedings of 2012 Annual Conference by the Rehabilitation Engineering and Assistive Technology Society of North America.* (Baltimore, MD, 2012).

Presentations

1. BEITER, K. B. AND WALLACE, H., Excel Grade Book. Instructional Technology Consortium presentation, National Technical Institute for the Deaf, Rochester, NY (2004, November)

2. BEITER, K. B. AND LUCAS, D., Working Together: Deaf and Hearing People. Presentation made at Excellus Insurance Company, Utica, NY (2004, October)

3. BEITER, K. B., Grading Methods Utilizing Excel. Instructional Technology Consortium workshop, National Technical Institute for the Deaf, Rochester, NY (2003, May)

4. BEITER, K. B., Harnessing the Power of PowerPoint to Create Presentations. Paper presented at 2003 National Training Conference on Employment of Federal Employees Who are Deaf and Hard of Hearing, Bethesda, MD (2003, March)

5. BEITER, K. B., Technology in Deaf Education. Paper presented at Future Leaders of Tomorrow Conference, Southern Methodist University, Dallas, TX. (2001, November)

Workshops Presented

(Deaf Initiative in Technology Week-long Workshops)

1. BEITER, K. B. AND LANGE, D. A., Intermediate Excel 2010, Bank of NY Mellon Foundation, Heinz Endowments and NTID (DIIT), held in Pittsburg, PA (2013, February)

2. BEITER, K. B., OLSEN, E. M., AND LANGE, D. A., Intro to LibreOffice, Max Factor Grant and NTID (DIIT), held in Los Angeles, CA (2012, March)

3. BEITER, K. B., OLSEN, E. M., AND LANGE, D. A., Excel 2010, Bank of NY Mellon Foundation, Heinz Endowments and NTID (DIIT), held in Pittsburg, PA (2011, August)

4. BEITER, K. B., OLSEN, E. M., AND LANGE, D. A., Microsoft Office 2007, Bank of NY Mellon Foundation, Heinz Endowments and NTID (DIIT), held in Pittsburg, PA (2010, August)

5. BEITER, K. B., OLSEN, E. M., AND LANGE, D. A., Adobe Flash CS4, Max Factor Grant and NTID (DIIT), held in Los Angeles, CA (2010, March)

6. BEITER, K. B., OLSEN, E. M., AND LANGE, D. A., <u>Creating Websites with XHTML & Adobe Dreamweaver CS4</u>, Max Factor Grant and NTID (DIIT), held in Los Angeles, CA (2009, March)

7. BEITER, K. B., <u>Microsoft Office 2007</u>, NTID (DIIT), held at National Technical Institute for the Deaf, Rochester, NY (2008, July)

8. BEITER, K. B. AND OLSEN, E. M., <u>Microsoft PowerPoint</u>, NTID (DIIT), held in University High School, Irvine, CA (2006, March)

9. BEITER, K. B., AND OLSEN, E. M., <u>Introduction to Microsoft Office</u>, NTID (DIIT), held in PUENTE Learning Center, Los Angeles, CA (2006, March)

10. BEITER, K. B., <u>Introduction to JavaScript</u>, NTID (DIIT), held at National Technical Institute for the Deaf, Rochester, NY (2005, June)

11. BEITER, K. B., <u>Introduction to Macromedia Flash MX 2004</u>, NTID (DIIT), held at National Technical Institute for the Deaf, Rochester, NY (2005, February)

12. BEITER, K. B., <u>Introduction to Macromedia Dreamweaver MX 2004</u>, NTID (DIIT), held at National Technical Institute for the Deaf, Rochester, NY (2005, January)

13. BEITER, K. B., <u>Introduction to Microsoft PowerPoint</u>, NTID (DIIT), held at St. Mary's School for the Deaf, Buffalo, NY (2004, December)

14. BEITER, K. B., <u>Introduction to JavaScript</u>, NTID (DIIT), held at National Technical Institute for the Deaf, Rochester, NY (2004, February)

15. BEITER, K. B., <u>Introduction to JavaScript</u>, NTID (DIIT), held at National Technical Institute for the Deaf, Rochester, NY (2003, February)

(One-Day Workshops)

16. BEITER, K. B., <u>PowerPoint 2003</u>, 2006 Second National Training Conference for State Coordinators and Related Professionals Who Serve Individuals Who Are Deaf, Deaf-Blind, Hard of Hearing and Late Deafened, held at National Technical Institute for the Deaf, Rochester, NY (2006, May)

17. BEITER, K. B., <u>Introduction to Excel 2003 Spreadsheets</u>, 2006 Second National Training Conference for State Coordinators and Related Professionals Who Serve Individuals Who Are Deaf, Deaf-Blind, Hard of Hearing and Late Deafened, held at National Technical Institute for the Deaf, Rochester, NY (2006, May)

18. BEITER, K. B., <u>PowerPoint 2003</u>, An International Symposium: Instructional Technology and Education of the Deaf, held at National Technical Institute for the Deaf, Rochester, NY (2005, June)

Major Contributions to the Institute

Curriculum Related

1.	NTID Student Rating System Committee	2009- now
2.	NTID Curriculum Committee	2005-2009
3.	TechGirlz Implementation Committee	2005-2006
4.	Academic Potential Committee: Digital Arts Competition	2005
5.	Chair/Peer Observation Project Tool (GCOT)	2003-2005

Major Contributions to the Community

1.	Rochester Deaf Rotary (Founding Member, President Elect, Vice-President, President, Past-President)	2006- now
2.	Rochester Lutheran Campus Ministry (Treasurer, Board Officer)	2008- now
3.	Deaf Women of Rochester (Treasurer)	2004-2006
4.	NTID Alumni Reunions – 2003, 2008 (Co-Chairperson, Co-Advisor)	2001-2008
5.	International Lutheran Deaf Association 2009 Conference (Co-Chairperson)	2005-2010
6.	Alpha Lutheran Church of the Deaf (Treasurer, Secretary)	1990- now

Professional Memberships

ACM/SIGCSE (Association for Computing Machinery, Special Interest Group on Computer Science Education)

Certifications

1.	Sign Language Communication Proficiency Interview: Advanced Plus	September 2000
2.	Microsoft Access 2003 Specialist Certification	June 2005

Awards/Honors

Rotary's Paul Harris Fellowship Award, June 2004 (Award for helping found the world's first and only Rochester Rotary Club for the Deaf)

Last Updated: May 29, 2014

Chris Campbell

Rochester Institute of Technology
National Technical Institute for the Deaf
Information and Computing Studies Department
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Rochester, NY 14623
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Education

M.S., Computer Information Systems, University of Phoenix	**2000**
B.S., Business Management, Rochester Institute of Technology	**1996**

Career: Teaching

Instructor	Rochester Institute of Technology, Rochester, NY	2012-now

Career: Professional Experience

Application/Business Analyst	NTID, Department of Access Services Rochester, NY	2010-2012
Senior Software Developer	Apollo Group, Inc., Human Resources Phoenix, AZ	2004-2010
Software Developer II	Apollo Group, Inc., Information Technology Phoenix, AZ	2000-2004
Software Developer I	Apollo Group, Inc., Information Technology Phoenix, AZ	1999-2000
Webmaster	University of Phoenix, University Services Phoenix, AZ	1997-1999

Teaching/Tutoring Experience

Teaching:
0805-201 – Applications Software
0805-230 – Intro to Programming
0805-251 – Intro to Web Development
0805-310 – Microcomputer Database Software
NACA-160 – Programming Fundamentals I
NACA-172 – Website Development

NACT-170 – Intro to Web Development
NACT-230 – Intro to Programming
NACT-235 – Intro to Database Applications
NCAR-100 – Freshman Seminar

Summer Youth Camps:
TechGirlz – Build Your Own PC
Summer Vestibule Program – Sampling careers for incoming freshmen

Curriculum Development

New Semester Courses:
NACT-170 – Introduction to Web Development
NACT-230 – Introduction to Programming
NACT-235 – Introduction to Database Applications

Workshops Presented

19. CAMPBELL, C. M. AND TRAGER, B. S., <u>Introduction to Visual Studio 2012 and the C# Programming Language</u>, NTID, held at Golisano College of Computing & Information Sciences (2014, January)

Major Contributions to the Institute

6. NTID Committee for Sustainable Practices (chairperson)   2011-2012
7. NTID Committee for Faculty/Staff Sign Language Communication   2011-2012
   Expectations
8. Program Development Committee – Mobile Application Development   2013-now

Major Contributions to the Community

7. Rochester School for the Deaf Parent Staff Association (Secretary)   2013-2014
8. Rochester School for the Deaf Parent Staff Association (President)   2014-now

Certifications

3. Sign Language Communication Proficiency Interview: Advanced   January 2012

Raja S. Kushalnagar, J.D., LL.M., Ph.D.

Rochester Institute of Technology
GOL-1517, 96 Lomb Memorial Drive
Rochester, NY 14623-5604, USA

(585) 643-6773
rskics@rit.edu
www.cs.rit.edu/~rskics/

Career

Assistant Professor, Information and Computing Studies 2011-Now
Rochester Institute of Technology, Rochester, NY

Instructor, Information and Computing Studies 2010-2011
Rochester Institute of Technology, Rochester, NY

Teaching Assistant, Summer Academy for **Deaf and Hard** of **Hearing** 2007
University of Washington, Seattle, WA

Information Protection Manager, Information Technology Services 2000-2002
Gallaudet University, Washington DC

Member of **Technical Staff I, Bell Laboratories** 1997-2000
Bell Labs at Lucent Technologies, Naperville, IL

Education

Ph.D., Computer Science, University of Houston .... December 2010
Dissertation: Optimizing Video Presentations for Deaf Students in mainstream classrooms.
Drs. Jehan-Francois Paris, Jaspal Subhlok, Rong Zheng, Zhigang Deng and Richard Ladner.

LL.M., Intellectual Property and Information Law, University of Houston .... May 2010
Paper: Balancing Perceptually Disabled Consumers' Rights Against Copyright Holders' Rights.
Advisor: Greg Vetter, Esq.

J.D., cum laude, Thurgood Marshall School of Law, Texas Southern University .... May 2008
Advisor: Okezie Chukwumerije, Esq.

M.S., Computer Science, Rochester Institute of Technology .... August 1999
Thesis: An automated American Sign Language Parser.
Advisor: Dr. Peter G. Anderson

B.S., Applied Physics, Angelo State University .... August 1994
Advisor: Dr. H. Ray Dawson

Research Goals

Modern software user interfaces increasingly mirror physical and social interaction, as this leverages existing human interactive knowledge. However, the range and experience of this interaction, such as gesture and speech is incredibly diverse and can be a barrier for users with different abilities and cultures. My research aim is to develop efficient multi-modal interfaces for more inclusive and effective software for users with different abilities and backgrounds.

Teaching Experience

Teaching: Courses

TC.08	NACA-160 - Programming Fundamentals I	Spring 2014
TC.07	NACT-250 - Computer and Data Security	Fall 2013
TC.06	0805-353 - Computer Forensics	Winter 2012
TC.05	0805-390 - Programming Fundamentals	Spring 2012
TC.04	0805-353 - Computer Forensics	Winter 2011
TC.03	0805-390 - Programming Fundamentals	Fall 2011
TC.02	0805-390 - Programming Fundamentals	Spring 2011
TC.01	0805-390 - Programming Fundamentals	Fall 2010

Teaching: Support

TS.44	CSCI-141 - Computer Science I	Spring 2014
TS.43	CSCI-142 - Computer Science II	Spring 2014
TS.42	CSCI-251 - Concepts of Parallel and Distributed Systems	Spring 2014
TS.41	ISTE-100 - Computing and Problem Solving I (C++)	Spring 2014
TS.40	ISTE-100 - Computing and Problem Solving II (C++)	Spring 2014
TS.39	ISTE-121 - Computing and Problem Solving II (Java)	Spring 2014
TS.38	CSCI-101 - Principles of Computing	Fall 2013
TS.37	CSCI-141 - Computer Science I	Fall 2013
TS.36	CSCI-142 - Computer Science II	Fall 2013
TS.35	CSCI-242 - Computer Science for Transfers	Fall 2013
TS.34	CSCI-243 - Mechanics of Programming	Fall 2013
TS.33	CSCI-251 - Concepts of Parallel and Distributed Systems	Fall 2013
TS.32	CSCI-261 - Analysis of Programming	Fall 2013
TS.31	4050-302 - Scripting In Perl	Fall 2013
TS.30	4002-217 - Programming for Info Tech I	2012-2013
TS.29	4002-218 - Programming for Info Tech II	2012-2013
TS.28	4002-219 - Programming for Info Tech III	2012-2013
TS.27	4003-241 - Problem-based Intro Cs	2012-2013
TS.26	4002-320 - Introduction to Multimedia	2012-2013
TS.25	4002-242 - Data Struct Prob Solve	2012-2013
TS.24	4002-243 - O-O Programming	2012-2013
TS.23	4002-206 - Web Foundations	2012-2013
TS.22	4002-208 - Intro To Programming	2012-2013
TS.21	4002-210 - Programming With Classes	2012-2013
TS.20	4002-217 - Programming for Info Tech I	2011-2012
TS.19	4002-218 - Programming for Info Tech II	2011-2012
TS.18	4002-219 - Programming for Info Tech III	2011-2012
TS.17	4003-241 - Problem-based Intro Cs	2011-2012
TS.16	4002-320 - Introduction to Multimedia	2011-2012
TS.15	4002-242 - Data Struct Prob Solve	2011-2012
TS.14	4002-243 - O-O Programming	2011-2012
TS.13	4002-206 - Web Foundations	2011-2012
TS.12	4002-208 - Intro To Programming	2011-2012

TS.11 4002-210 - Programming With Classes	2011-2012
TS.10 4002-217 - Programming for Info Tech I	2010-2011
TS.09 4002-218 - Programming for Info Tech II	2010-2011
TS.08 4002-219 - Programming for Info Tech III	2010-2011
TS.07 4003-241 - Problem-based Intro Cs	2010-2011
TS.06 4002-320 - Introduction to Multimedia	2010-2011
TS.05 4002-242 - Data Struct Prob Solve	2010-2011
TS.04 4002-243 - O-O Programming	2010-2011
TS.03 4002-206 - Web Foundations	2010-2011
TS.02 4002-208 - Intro To Programming	2010-2011
TS.01 4002-210 - Programming With Classes	2010-2011

Teaching: Curriculum Development

TD.05 NACA-162 - Programming Fundamentals II	Fall 2013
TD.04 NACA-161 - Programming Fundamentals I	Spring 2012
TD.03 NACT-250 - Computer and Data Security	Spring 2012
TD.02 0805-398 - Windows Mobile Phones	Winter 2012
TD.01 0805-353 - Computer Forensics	Fall 2011

Teaching: Programs

TP.07 Summer Vestibule Program, National Technical Institute for the Deaf	Aug 19-25, 2014
TP.06 Stepping Stones to Success, National Technical Institute for the Deaf	Jul 26-27, 2014
TP.05 Stepping Stones to Success, National Technical Institute for the Deaf	Jul 25-27, 2013
TP.04 Summer Vestibule Program, National Technical Institute for the Deaf	Aug 19-25, 2013
TP.03 Summer Vestibule Program, National Technical Institute for the Deaf	Aug 20-27, 2012
TP.02 Summer Vestibule Program, National Technical Institute for the Deaf	Aug 22-29, 2011
TP.01 Summer Academy for Deaf and Hard of Hearing, U of Washington	June-Aug, 2007

Teaching Awards

| TA.01 RIT Heavy Hitter for Most Active myCourses Course (Top 1.3%) | Spring 2014 |

Teaching and Professional Certifications

Teaching: Related Certifications

| TPC.02 Sign Language Proficiency Interview (SLPI): Advanced Plus to Superior Plus | 2013 |
| TPC.01 Certified Information Systems Security Professional (CISSP) | 2001 |

Research Experience

Peer-Refereed papers, published in Conference Proceedings[1]

PCP.25 Raja S. Kushalnagar and Poorna Kushalnagar. Live and Collaborative Gaze Review for Deaf and Hard of Hearing Students. In International Conference on Computers Helping People, pages 72–80, Paris, France, July 2014. Springer-Verlag [36%]

PCP.24 Raja S. Kushalnagar, Ramachandran Vignesh, and Tae Oh. Tactile Captions: Augmenting Visual Captions. In International Conference on Computers Helping People, pages 101–109, Paris, France, 2014. Springer-Verlag [36%]

PCP.23 W. L. Lasecki, Raja. S. Kushalnagar, and J. P. Bigham. Helping Students Keep Up with Real-Time Captions by Pausing and Highlighting. In 11th International Cross-Disciplinary Conference on Web Accessibility - W4A, pages 32:1–32:8, Seoul, South Korea, 2014 [28%] *W4A Best Technical Paper

PCP.22 Raja. S. Kushalnagar and Karen B. Beiter. Optimal Viewing Distance for Deaf Signers. In CSUN Conference, page 5, San Diego, CA, February 2014. CSUN [50%]

PCP.21 Walter S. Lasecki, Christopher D. Miller, Raja Kushalnagar, and Jeffrey P. Bigham. Real-time captioning by non-experts with legion scribe. In Proceedings of the 15th Inter- national ACM SIGACCESS Conference on Computers and Accessibility - ASSETS '13, pages 1–2, New York, New York, USA, October 2013. ACM Press. ISBN 9781450324052. doi: 10.1145/2513383.2513401. URL http://dl.acm.org/citation.cfm?doid=2513383.2513401 [29%]

PCP.20 Raja S. Kushalnagar, David E. Lawrence, and Elissa M. Olsen. A transition community for deaf and hard of hearing students in information technology programs. In Proceedings of the 13th annual ACM SIGITE conference on Information technology education - SIGITE '13, page 143, New York, New York, USA, October 2013. ACM Press. ISBN 9781450322393. doi: 10.1145/2512276.2512319. URL http://dl.acm.org/citation.cfm?doid=2512276.2512319 [45%]

PCP.19 Raja S. Kushalnagar, Brian P. Trager, Karen B. Beiter, and Noella A. Kolash. American Sign Language: Maximum Live Replay Speed. In Rehabilitation Engineering and Assistive Technology Society of North America, pages 1–4, Seattle, WA, June 2013. RESNA. URL http://resna.org/conference/proceedings/2013/PDFVersions/SpecialEd/Kushalnagar.pdf [50%]

PCP.18 Raja S. Kushalnagar, Walter S. Lasecki, and Jeffrey P. Bigham. Captions Versus Tran- scripts for Online Video Content. In ACM, editor, 10th International Cross-Disciplinary Conference on Web Accessibility (W4A), pages 32:1–32:4, Rio De Janerio, Brazil, May 2013. ACM Press. doi: 10.1145/2461121.2461142. URL http://dl.acm.org/citation.cfm?id=2461142 [45%]

PCP.17 Walter S. Lasecki, Christopher D Miller, Raja S. Kushalnagar, and Jeffrey P. Bigham. Le- gion Scribe: Real-Time Captioning by the Non-Experts. In ACM, editor, 10th International Cross-Disciplinary Conference on Web Accessibility (W4A), Rio De Janerio, Brazil, March 2013. ACM Press. doi: 10.1145/2461121.2461151. URL http://dl.acm.org/citation.

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[1] Premier conferences in computer science and human-computer interaction (e.g., ASSETS, CSCW, CHI, IUI, UIST) are highly selective and intended for archival papers only. These conferences often exceed journals in their selectivity, visibility, and impact. Submissions undergo multiple rounds of review before being accepted for publication. Please see http://portal.acm.org/citation.cfm?id=1743546.1743569 (REF-1) for a study comparing the impact of conference papers and journals in these areas. When appropriate, the acceptance rate appears in brackets following each citation.

cfm?doid=2461121.2461151 [28%]

*W4A Accessibility Challenge Delegate's Award

PCP.16 Joseph S. Stanislow and Raja S. Kushalnagar. Adapting STEM lectures for culturally and linguistically diverse classrooms. In 2013 IEEE Integrated STEM Education Conference (ISEC), pages 1–4, Princeton, NJ, March 2013. IEEE. ISBN 978-1-4673-5624-4. doi: 10. 1109/ISECon.2013.6525229. URL http://ieeexplore.ieee.org/lpdocs/epic03/wrapper. htm?arnumber=6525229

PCP.15 Lalit K. Phadtare, Raja S. Kushalnagar, and Nathan D. Cahill. Detecting hand-palm orientation and hand shapes for sign language gesture recognition using 3D images. In IEEE, editor, 2012 Western New York Image Processing Workshop, pages 29–32, Rochester, November 2012. IEEE. ISBN 978-1-4673-5600-8. doi: 10.1109/WNYIPW.2012.6466652. URL http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=6466652

PCP.14 Raja S. Kushalnagar, Walter S. Lasecki, and Jeffrey P. Bigham. A readability evalu- ation of real-time crowd captions in the classroom. In Proceedings of the 14th inter- national ACM SIGACCESS Conference on Computers and Accessibility - ASSETS '12, pages 71–78, New York, New York, USA, October 2012. ACM Press. ISBN 9781450313216. doi: 10.1145/2384916.2384930. URL http://dl.acm.org/citation.cfm?doid=2384916. 2384930 [28%]

PCP.13 Walter Lasecki, Christopher Miller, Adam Sadilek, Andrew Abumoussa, Donato Borrello, Raja S. Kushalnagar, and Jeffrey Bigham. Real-time captioning by groups of non-experts. In Proceedings of the 25th annual ACM symposium on User interface software and technol- ogy - UIST '12, pages 23–34, New York, New York, USA, October 2012. ACM Press. ISBN 9781450315807. doi: 10.1145/2380116.2380122. URL http://dl.acm.org/citation.cfm? doid=2380116.2380122 [22%]

PCP.12 Raja S. Kushalnagar and Poorna Kushalnagar. Deaf and Hearing Students' Eye Gaze Collaboration. In Klaus Miesenberger, Arthur Karshmer, Petr Penaz, and Wolfgang Za- gler, editors, The International Conference on Computers Helping People, volume 7382 of Lecture Notes in Computer Science, pages 92–99, Berlin, Heidelberg, July 2012. Springer Berlin Heidelberg. ISBN 978-3-642-31521-3. doi: 10.1007/978-3-642-31522-0\ _14. URL http://www.springerlink.com/index/10.1007/978-3-642-31522-0 [36%]

PCP.11 Poorna Kushalnagar, Bernard P. Williams, and Raja S. Kushalnagar. Community-Based Participatory Approach: Students as Partners in Educational Accessible Technology Re- search. In Klaus Miesenberger, Arthur Karshmer, Petr Penaz, and Wolfgang Zagler, edi- tors, Proceedings of The International Conference on Computers Helping People, volume 7382 of Lecture Notes in Computer Science, pages 59–64, Berlin, Heidelberg, July 2012. Springer Berlin Heidelberg. ISBN 978-3-642-31521-3. doi: 10.1007/978-3-642-31522-0_ 9. URL http://www.springerlink.com/index/10.1007/978-3-642-31522-0_9 [36%]

PCP.10 Raja S. Kushalnagar, Brian P. Trager, and Karen B. Beiter. Assistive View Replay for Deaf Students. In Proceedings of the 2012 Annual Conference by the Rehabilitation Engi- neering and Assistive Technology Society of North America. Baltimore, MD., Baltimore, MD, June 2012. RESNA. URL http://web.resna.org/conference/proceedings/2012/ Cognitive/AssistiveViewReplay.html

PCP.09 Raja S. Kushalnagar, Poorna Kushalnagar, and Gianni Manganelli. Collaborative Gaze Cues for Deaf Students. In Proceedings of the Dual Eye Tracking Workshop at the Com- puter Supported Cooperative Work and Social Computing Conference, Seattle, WA, March 2012. ACM Press. URL http://www.dualeyetracking.org/duet2012/Program_files/ DUET2012_4.pdf

PCP.08 Raja S. Kushalnagar, Stephanie A. Ludi, and Poorna Kushalnagar. Multi-view plat- form: An Accessible Live Classroom Viewing Device. In Proceedings of the 13th interna- tional ACM SIGACCESS conference on Computers and accessibility - ASSETS '11, pages 267–268, New York, New York, USA, October 2011. ACM Press. ISBN 9781450309202. doi: 10.1145/2049536.2049600. URL http://dl.acm.org/citation.cfm?doid=2049536.2049600 [31%]

PCP.07 Brian P. Trager and Raja S. Kushalnagar. Efficacy of a Direct Learning Tool for Deaf and Hard of Hearing Students. In Proceedings of Society for Information Technology & Teacher Education International Conference 2011, pages 3667–3673, Nashville, Tennessee, USA, March 2011. AACE. URL http://www.editlib.org/p/36894 [45%]

PCP.06 Raja S. Kushalnagar and Brian P. Trager. Improving classroom visual accessibility with cooperative smartphone recordings. ACM SIGCAS Computers and Society, 41(2):51–58, December 2011. ISSN 00952737. doi: 10.1145/2095272.2095277. URL http://dl.acm.org/citation.cfm?doid=2095272.2095277 [35%]

PCP.05 R.S. Kushalnagar and Jehan-Francois Paris. Evaluation of a scalable and distributed mo- bile device video recording approach for accessible presentations. In Proceedings of the 29th International Performance Computing and Communications Conference (IPCCC), pages 81–88, Albuquerque, NM, December 2010. IEEE. ISBN 978-1-4244-9330-2. doi: 10.1109/PCCC.2010.5682331. URL http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=5682331 [29%]

PCP.04 Raja S. Kushalnagar, Anna C. Cavender, and Jehan-Francois Paris. Multiple view per- spectives: improving inclusiveness and video compression in mainstream classroom record- ings. In Proceedings of the 12th international ACM SIGACCESS conference on Com- puters and accessibility - ASSETS '10, pages 123–130, New York, New York, USA, Oc- tober 2010. ACM Press. ISBN 9781605588810. doi: 10.1145/1878803.1878827. URL http://portal.acm.org/citation.cfm?doid=1878803.1878827 [31%]

PCP.03 R.S. Kushalnagar and J.F. Paris. Multiple View Scalability of Presentations Distributed to Heterogeneous Devices. In Proceedings of 2010 International Symposium on Performance Evaluation of Computer and Telecommunication Systems - SPECTS '10, pages 7–13, Ot- tawa, Canada, July 2010. IEEE. ISBN 978-1-56555-340-8. URL http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5589004&isnumber=5587938 [50%]

PCP.02 Raja S. Kushalnagar and Jehan-Francois Paris. Empowering Deaf Students with Multiple Views. In Proceedings of the 2010 Technology and Deaf Education: Exploring Instruc- tional and Access Technologies, Rochester, NY, June 2010. URL http://www.rit.edu/~w~tecsym/papers/2010/T1B.pdf

PCP.01 Raja. S. Kushalnagar and Jehan-Francois Paris. Evaluation of a scalable and distributed mobile device video recording approach for accessible presentations. In International Per- formance Computing and Communications Conference, pages 81–88, Mannheim, Germany, December 2010. IEEE. ISBN 978-1-4244-9330-2. doi: 10.1109/PCCC.2010.5682331. URL http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=5470563

Peer-Refereed Journal Papers

PJP.03 Henry Adler, Bonnie Jacob, Kim Kurz, and Raja Kushalnagar. Undergraduate Research in Mathematics with Deaf and Hard of Hearing Students: Four Perspectives. Involve: A Journal Of Mathematics, 1(1):1–10, 2014. ISSN 1944-4184. doi: 10.2140/involve.2014.7.101

PJP.02 Raja. S. Kushalnagar, Walter S. Lasecki, and Jeffrey P. Bigham. Accessibility Evaluation of Classroom Captions. ACM Transactions on Accessible Computing, 5(3):1–24, January

2014. ISSN 19367228. doi: 10.1145/2543578. URL http://dl.acm.org/citation.cfm?doid=2568367.2543578

PJP.01 Tom Humphries, Raja Kushalnagar, Gaurav Mathur, Donna Jo Napoli, Carol Padden, Christian Rathmann, and Scott Smith. The right to language. The Journal of law, medicine & ethics : a journal of the American Society of Law, Medicine & Ethics, 41(4):872–84, December 2013. ISSN 1748-720X. doi: 10.1111/jlme.12097. URL http://www.ncbi.nlm.nih.gov/pubmed/24446945

Book Chapters

PBC.01 Poorna Kushalnagar, Khadijat Rashid, and Raja S. Kushalnagar. How Deaf Adult Sign- ers Experience Implants: Some Preliminary Conclusions. In Irene W. Leigh and Raylene Paludneviciene, editors, Cochlear Implants: Evolving Perspectives, chapter 4, pages 45–59. Gallaudet University Press, Washington, D.C., May 2011. ISBN 978-1-56368-503-3. URL http://gupress.gallaudet.edu/excerpts/CItoc.html

Peer-Refereed Conference Posters and Presentations

PPP.17 Thomas Ansill, Jaime Penzellna, Raja S. Kushalnagar, and Daniel Saavedra. Undergraduate Research in Mathematics with Deaf and Hard of Hearing Students, 2014

PPP.16 Noella A. Kolash, Poorna Kushalnagar, and Raja S. Kushalnagar. AVD Eye-Tracking. In RIT Undergraduate Symposium, Rochester, NY, 2013

PPP.15 Raja S. Kushalnagar, Brian P. Trager, and Karen B. Beiter. Accessible Viewing Devices for Deaf and Hard of Hearing Students. In Convention of American Instructors of the Deaf, Rochester, NY, June 2013. URL http://www.caidconference.org/2013/

PPP.14 Raja. S. Kushalnagar. Deaf and Hard of Hearing Students' Gaze Patterns. In National Laboratories Workshop, Oak Ridge, TN, June 2013

PPP.13 Raja S. Kushalnagar. ASL-STEM: Community Development of Signs for STEM. In International Pacific Rim Conference on Disabilities, Honolulu, HI, April 2013. International Pacific Rim Conference on Disabilities

PPP.12 Raja S. Kushalnagar. Leveraging Copyright Law to Improve Accessibility for Perceptually Disabled Consumers for resources such as ASL-STEM. In Cherry Blossom Symposium on Intellectual Property and Federal Policy: Universal Access in the Digital Environment, Washington, D.C., April 2013

PPP.11 Raja. S. Kushalnagar and Joseph S. Stanislow. Maximizing Content Learning for English as a Second Language Students. In New York Society of Engineering Technology Association, Rochester, NY, October 2012

PPP.10 Joseph S. Stanislow and Raja. S. Kushalnagar. Using Notes to Support Vocabulary Accuracy in Teacher, Interpreter and Student Communication. In New York Society of Engineering Technology Association, Rochester, NY, October 2012

PPP.09 Noella A. Kolash and Raja. S. Kushalnagar. Accessible Viewing Device: Implementing Functionality through JQuery. In RIT Undergraduate Symposium, Rochester, NY, August 2012

PPP.08 Raja. S. Kushalnagar. Accessible Viewing Device: Video Compression. In Academic Conference Workshop, Atlanta, GA, April 2012

PPP.07 Raja S. Kushalnagar and Joseph S. Stanislow. Maximizing content learning for deaf students and English as a second language students. In Proceedings of the 43rd ACM technical symposium on Computer Science Education - SIGCSE '12, pages 668–669, New York, New

York, USA, March 2012. ACM Press. ISBN 9781450310987. doi: 10.1145/2157136.2157380. URL http://dl.acm.org/citation.cfm?doid=2157136.2157380 [30%]

PPP.06 Raja S. Kushalnagar. Multiple Views: Enhanced Medical Interpreter Accessibility for Deaf Signers. In Rochester General Hospital System - Rochester Institute of Technology Conference, Rochester, NY, 2011

PPP.05 Raja S. Kushalnagar. Multiple Viewing Perspectives in the Classroom. In Teaching and Learning Technical Symposium, Ithaca College, Ithaca, NY, 2011. Technology Learning and Technology Symposium

PPP.04 Raja S. Kushalnagar and Brian P. Trager. Impact of Direct Visual Tutoring for Deaf Students. In ACM Special Interest Group on Computer Science Education, Denver, CO, April 2011 [30%]

PPP.03 R. S. Kushalnagar. Accessible Electronic Health Records: A Legal Perspective. In Workshop on Accessible Electronic Health Records, Orlando, FL, October 2010

PPP.02 Raja. S. Kushalnagar. Multiple Viewing Perspectives: Java Enabled Webcams. In Academic Conference Workshop, Houston, TX, April 2010

PPP.01 Raja S. Kushalnagar. Impact of the Copyright Limitation for Sensory Disabilities on Assistive Technology. In ACM, editor, Proceedings of International Conference for High Performance Computing, Networking, Storage and Analysis - SC 08, Austin, TX, November 2008. URL http://faculty.cns.uni.edu/~rothm/Abstracts/Dean.htm

Published Working Papers

PWP.04 Raja. S. Kushalnagar. Designing an Accessible Broadband Peer Community for Students with Sensory Disabilities, 2014

PWP.03

PWP.02 Richard E. Ladner, Harry G. Lang, and Raja S. Kushalnagar. Technical Resources Available for STEM Students. Workshop for Emerging Deaf and Hard of Hearing Scien- tists, pages 43–52, January 2013. URL http://www.washington.edu/accesscomputing/WhitePaper-Final_Gallaudet_Emerging_Sci_2_15_13.pdf

PWP.01 Raja S. Kushalnagar. Balancing Perceptually Disabled Consumers' Rights Against Copyright Holders' Rights. SSRN Electronic Journal, pages 1–35, August 2009. ISSN 1556-5068. doi: 10.2139/ssrn.1475449. URL http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1475449http://www.ssrn.com/abstract=1475449

Invited Talks

PIT.08 Raja. S. Kushalnagar. Accessible Views: Seeing Lectures through Deaf Students' Eyes, 2014. URL http://www.rit.edu/academicaffairs/destinationintersession/sites/rit.edu.academicaffairs.destinationintersession/files/images/showcaseschedule.pdf

PIT.07 Raja S. Kushalnagar. Graduate School STEM Programs: Important Factors to consider for Deaf and Hard of Hearing Students. In Summer Academy for Deaf and Hard of Hearing Students, Seattle, WA, July 2013

PIT.06 Raja S. Kushalnagar. The First Internet Worm - Morris Worm. In Society of Software En- gineers, Rochester Institute of Technology, Rochester, NY, April 2013. URL http://www. youtube.com/watch?v=YnUkyqawuWU&feature=c4-overview&list=UUuHLRkeHIXdEiH-srG92Tsg

PIT.05 Raja S. Kushalnagar. Life as a Deaf Graduate Student in STEM before and after ADA. In Summer Academy for Deaf and Hard of Hearing Students, Seattle, WA, 2012

PIT.04 Raja S. Kushalnagar. Accessible Viewing for Deaf and Hard of Hearing Students. In Communications and Culture, Ryerson University, Toronto, ON, March 2012. Ryerson University

PIT.03 Raja S. Kushalnagar. Deaf and Hard of Hearing STEM Students in Graduate School. In Summer Academy for Deaf and Hard of Hearing Students, Seattle, WA, 2011

PIT.02 Raja. S. Kushalnagar. Intellectual Property for Deaf. In Business Conference Expo for the Deaf, Houston, TX, May 2010

PIT.01 Raja S. Kushalnagar. Perceptions of Deaf and Hard of Hearing Students, The barriers faced during classes and job searches & their resulting adaptations and choices. In Proceedings of SC 07, Reno, NV, 2007. International Conference for High Performance Computing, Networking, Storage and Analysis

Invited Panels and Working Groups

PIP.04

PIP.03 Sandi Connolly, Ann Hager, Ann Marie Kuntz, Raja S Kushalnagar, and Samantha Shupe. Working with Deaf and Hard of Hearing Students Panel, August 2013. URL https://wiki.rit.edu/display/NFO213/NFO+2013+Schedule+of+Events
*Highest rated session of all NFO sessions.

PIP.02 Advancing Deaf in Computing and Hard of Hearing. Dreaming of getting a Masters or PhD in Science, Computing, Engineering or Math fields?, April 2012. URL http://research.gallaudet.edu/~kjcole/videocast-2012-04-13.php

PIP.01 Joshua Beal, Karen Alkoby, David Fourney, Raja S. Kushalnagar, Ronald Painter, and Minoru Yoshida. Member of Student Working Group, Summit to Create a Cyber-Community to Advance Deaf and Hard of Hearing Individuals in STEM (DHH Cyber-Community), June 2008.
URL http://www.pathwaystoscience.org/programhub.asp?sort=RDE-RIT-DHHCyberCo

Technology Demonstrations

PTD.06

PTD.05 Raja S. Kushalnagar, Brian P. Trager, and Karen B. Beiter. Eye Gaze Control Using the Accessible Viewing Device. In Imagine RIT: Innovation and Creativity Festival, Rochester, NY, May 2013

PTD.04 Raja S. Kushalnagar, Brian P. Trager, and Karen B. Beiter. Accessible Viewing Device - Live Replay. In Imagine RIT: Innovation and Creativity Festival, Rochester, NY, June 2012

PTD.03 Raja S. Kushalnagar, Brian P. Trager, and Karen B. Beiter. Multiple Views Perspective - View Consolidation. In Imagine RIT: Innovation and Creativity Festival, Rochester, NY, 2011

PTD.02 Raja S. Kushalnagar and Brian P. Trager. Multiple Video Recordings: NTID Supported Classroom Recording Accessibility. In RIT Faculty Institute on Teaching and Learning Conference, Rochester, NY, May 2011

PTD.01 Brian P. Trager and Raja S. Kushalnagar. C2Learn. In RIT Faculty Institute on Teaching and Learning Conference, Rochester, NY, May 2011

Selected News Articles and Videos

PNV.06 Deaf Unity. Deaf Unity visits RIT/NTID, 2013. URL http://deafunity.org/article-interview/deaf-unity-visits-rit-ntid-america/

PNV.05 RIT University News. Effective Assistive Technology, 2013. URL http://www.youtube.com/watch?v=22vi51MLhBE

PNV.04 James Goodman. RIT professor works to make technology more accessible, January 2013. URL http://www.democratandchronicle.com/article/20130120/NEWS01/301200045/RIT-professor-works-make-technology-more-accessible

PNV.03 Phys.org. Crowdsourcing site compiles new sign language for math and science, 2012. URL http://phys.org/news/2012-12-crowdsourcing-site-language-math-science.html

PNV.02 Kathleen Smith. Kushalnagar FOCUS 2012, November 2011. URL http://www.ntid.rit.edu/sites/default/files/focus_springsummer2012_0.pdf

PNV.01 UHLC. University of Houston Law Center, Admissions Brochure, 2011. URL http://www.law.uh.edu/llm/brochure.pdf

Supervised Student Research

*Deaf, Hearing ; Current Job

SR.27 Daniel Steed   Summer 2014
  Research Assistant (Co-op position): Develop features for Accessible Viewing Device software and hardware: interface with portable eye-trackers to support gaze controlled video, or interfaces with digital vibration devices to provide tactile feedback that is synchronized with captions

SR.26 Vasu Gupta   Summer 2014
  Research Assistant (Co-op position): Develop features for Accessible Viewing Device software and hardware: interface with portable eye-trackers to support gaze controlled video, or interfaces with digital vibration devices to provide tactile feedback that is synchronized with captions

SR.25 John Rivera   Summer 2014
  Research Assistant (Co-op position): Develop features for Accessible Viewing Device software and hardware: interface with portable eye-trackers to support gaze controlled video, or interfaces with digital vibration devices to provide tactile feedback that is synchronized with captions

SR.24 Warrance Yu   Summer 2014
  Research Assistant (Co-op position): Develop features for Accessible Viewing Device software and hardware: interface with portable eye-trackers to support gaze controlled video, or interfaces with digital vibration devices to provide tactile feedback that is synchronized with captions

SR.23 Eric Epstein
  Collaborative Captions Assistant: Recruit and run studies   Spring 2014

SR.22 Wander Bravo
  Closed Cues Research Assistant: Develop interface for Closed Cues   Spring 2014

SR.21 Samuel Georgeo   2013 - 2014
  Collaborative Captions Assistant: Develop caption interface features

SR.20 Vignesh Ramachandran   2013 - 2014
  Collaborative Captions Assistant: Develop caption and tactile interface

SR.19 Joseph Vigilante   2013 - 2014
  Accessible Viewing Device Research Assistant: Video Editor

SR.18 Emily Werfel   Fall 2013
  Researh Study Assistant: Recruit and run Accessible Viewing Device studies

SR.17 Yue Ding   Fall 2013
  Analysis of student eye movements while watching mainstreamed lectures

SR.16 Youmee Lee, UX Designer, AT&T, Atlanta, GA   Spring 2013
  Accessible Viewing Device Research Assistant: Video Editor

SR.15 Huipu Yu   Spring 2013
  Accessible Viewing Device Study Assistant: Recruit and run studies

SR.14 Bradley Frank, IT Developer, Dow Chemicals, Lansing, MI   Spring 2013
  Accessible Viewing Device Co-op Student: Develop caption features

SR.13 Prerna Keshari , Software Developer, Matlab, Boston, MA   2012-2013
  Accessible Viewing Device Research Assistant: Develop eye-tracking control

SR.12 Michelle Chung   2012-2013
    ASL Avatars Study Assistant: Capture signs via Kinect

SR.11 Raghu Puppala   2012-2013
    ASL Avatars Research Assistant: Develop algorithms to classify signs

SR.10 Melvin Wingfield   2012-2013
    Collaborative Captioning: Analyze caption readability properties

SR.09 Kristin Parker

    2) ASL-STEM Research Assistant: Contribute STEM signs   2012-2013
    1) Collaborative Captions Assistant: Run and analyze eye-tracking studies   Spring 2014

SR.08 Noella Kolash

    2) Accessible Viewing Device (Co-op position): Develop replay features for AVD   2012-13
    1) Closed Cues Research Assistant: Develop interface for Closed Cues   Spring 2014

SR.07 Lalit Phadtare   2011-2012
    ASL Avatar Research Assistant: Classify ASL handshapes via Kinect

SR.06 Sai Krishna Mulpuru , Graduate Student, Vanderbilt University, Nashville, TN
    Multiple View Perspectives Assistant: Run eye-tracking studies   Fall and Winter 2012

SR.05 Joel Skelton   Summer 2012
    Research Study Assistant: Run eye-tracking studies for Multiple View Perspectives project

SR.04 Joseph Dalpra   Summer 2012
    Research Study Assistant: Run studies for Multiple View Perspectives project

SR.03 Rachel Yerian   Summer 2012
    Study Assistant: Contribute STEM signs to ASL-STEM

SR.02 Moges Gembero, Technician, Purple Communications, Rochester, NY   Summer 2011
    Research Assistant: Contribute STEM signs to ASL-STEM

SR.01 Tri Ngo, Network Administrator, Google, Mountain View, CA   Summer 2011
    Research Assistant (Co-op): Android Developer for Multiple View Perspectives project

Grants

Grants and Gifts: External

GGE.5 REU Supplement Principal Investigator		2013-2014	$16000
Design, evaluate and refine usability, presentation and readability issues for a new real-time crowd-sourced captioning software approach for deaf and hard of hearing students. The project will also evaluate technology and audiovisual factors in mainstream classroom.			
GGE.4 Time Warner Research Program Principal Investigator		2012-2013	$20000
Develop policy and design recommendations for inclusive virtual peer communities for students with sensory disabilities.			
GGE.3 MS Windows Mobile Phone Grant Principal Investigator		2012-2013	$4000
Microsoft Corporation Equipment Grant. Develop curriculum for a new course to teach application development skills for Windows Mobile Phones for Deaf and Hard of Hearing Students.			
GGE.2 NSF Collaborative Captioning Principal Investigator		2012-2015	$97446
Design, evaluate and refine usability, presentation and readability issues for a new real-time crowd-sourced captioning software approach for deaf and hard of hearing students. The project will also evaluate technology and audiovisual factors in mainstream classroom.			
GGE.1 NSF ASL-STEM Senior Personnel		2012-2013	$69181
DHH Cyber Community - Supporting Deaf and Hard of Hearing Students in STEM Fields Develop and post new and unique video recordings of STEM vocabulary signs and related definitions to the ASL STEM Forum web site.			
Total External Grants		2011-2015	$206627

Grants and Gifts: Internal

GGI.5 Provost's Learning Innovation Gr. Principal Investigator		2013-2014	$5000
Closed Visual Cues for Introductory Programming Tutorial Videos.			
GGI.4 Effective Access Technology Grant Principal Investigator		2012-2013	$7180
Accessible Viewing Device: Eye-Gaze-Controlled Live Replay to Automatically Review Missed Information.			
GGI.3 College of Science Grant Co-Principal Investigator		2012-2013	$48395
3-D Computer Vision System for Synthesizing American Sign Language in Avatars: Design a system for ASL signers to automatically record signs that will be used to synthesize virtual human signers.			
GGI.2 Boot Camp Seed Grant Principal Investigator		2011-2012	$5000
Viewing Devices: Enhance Classroom Access by identifying and quantifying visual cues to aid deaf and hard of hearing students manage attentional resources in mainstreamed classrooms.			
GGI.1 NTID Innovation Grant Principal Investigator		2011-2013	$76922
Empowering Mainstreamed DHH Students with Personal Multiple View Perspectives: Develop a mobile personalized multiple video platform that reduces cognitive load for deaf and hard of hearing students in mainstreamed classrooms.			
Total Internal Grants		2011-2015	$142497

Honors and Awards

Teaching

HAT.01 Heavy Hitters Award for Most Active Course (Top 1%) Fall 2013

Research

HAR.03 NTID Scholarship Award for Pre-Tenure Faculty	2012-13
HAR.02 Gallaudet University Alumni Association Graduate Fellowship	2005-08
HAR.01 Alexander Graham Bell Association: Robert Weitbrecht Scholarship	1988-90

Workshop and Conference Travel Grants

HAW.08 POD Leadership Institute, Inclusive Leadership, Ithaca, NY	Jun 2014
HAW.07 CURM Student Research Conference, Salt Lake City, UT	Mar 2014
HAW.06 Signing Creatures Workshop, Washington, DC	Nov 2013
HAW.05 National Labs Professional Development Workshop, Oak Ridge, TN	May 2013
HAW.04 Academic Career Workshop, Atlanta, GA	Mar 2012
HAW.03 Accessible Electronic Health Records Workshop, Orlando, FL	Oct 2010
HAW.02 Pervasive Computing Conference, Mannheim, Germany	Mar 2010
HAW.01 Academic Career Workshop, Houston, TX	Feb 2010

Professional and Research Development

Research and Administration

PRA.29 POD Leadership Institute, Inclusive Leadership, Ithaca, NY	June 6-12, 2014
PRA.28 Tenure and Promotion Workshop	Apr 17, 2014
PRA.27 Logic Model Training Workshop	Apr 9, 2014
PRA.26 Access Technology Commercialization Workshop	Feb 8, 2014
PRA.25 NIH Grantseeking without Grief	Jan 22, 2014
PRA.24 Project Management Skills for Non-Project Managers	Nov 14, 2013
PRA.23 Early Alert Training (Starfish)	Sep 27, 2013
PRA.22 NSF Day Workshop	Nov 8, 2013
PRA.21 The Budget Process at NTID	May 9, 2013
PRA.20 Writing Successful Grants	Mar 22, 2013
PRA.19 Accounting for Cost Share Commitments	Jan 24, 2013
PRA.18 Evaluation and Assessment	Jan 16, 2013
PRA.17 Guidelines for Planning NTID Events	Jan 8, 2013
PRA.16 Responding to Department of Defense Broad Agency Announcements	Dec 6, 2012
PRA.15 RIT Educational Benefits	Dec 4, 2012
PRA.14 Other Direct Costs	Nov 8, 2012
PRA.13 Oracle Reports	Oct 18, 2012
PRA.12 Oracle Journals	Oct 16, 2012
PRA.11 Oracle Requisitions	Oct 16, 2012
PRA.10 Introduction to Accounting for Grants and Contracts	Oct 15, 2012
PRA.09 Research Compliance	Oct 11, 2012
PRA.08 Introduction to Accounting	Sep 20, 2012

PRA.07 Hiring, Supervising and Retaining Student Employees	Aug 23, 2012
PRA.06 Using Zotero: A Next-Generation Citation Management System	Mar 23, 2012
PRA.05 Getting Started in Funded Research	Jan 2, 2012
PRA.04 NIH Overview	Mar 29, 2011
PRA.03 Human Subjects Research	Mar 15, 2011
PRA.02 Peer Review	Mar 4, 2011
PRA.01 Technology Commercialization	Jan 19, 2011

Teaching and Tutoring

PTT.08 Visual Studio 2012 and the C# Programming Language	January 12, 2014
PTT.07 Hearing and Deaf Cultures: A Comparison of Value Systems	Dec 5, 2013
PTT.06 Facilitating Cooperative Learning in Student Workgroups	Apr 22, 2013
PTT.05 Faculty Development Resources at The Wallace Center	Jan 11, 2013
PTT.04 Understanding RIT's Student Learning, Support & Assessment Programs	Dec 10, 2012
PTT.03 Tutoring ... The Next Generation	May 24, 2012
PTT.02 Language Use in Research and Academic Settings	May 23, 2012
PTT.01 Working with NTID Students: Insights from Research and Scholarship	Sep 13, 2011

Spoken Communication Techniques and Strategies

PSC.06 Current Trends in Technology and Software	Mar 13, 2014
PSC.05 "What is it like to Choose and Live with a Cochlear Implant" Deaf Author's Diverse Perspectives	Feb 21, 2014
PSC.04 Diversity in the classroom. Why?	Jan 23, 2014
PSC.03 What's App-ening? Exploring Communication Apps	Dec 12, 2013
PSC.02 NTID Students' Communication Skills: Information and Access	Dec 14, 2012
PSC.01 SCTS Cochlear Implant Workshop	Jan 24, 2012

Service - Department, College and Institute

Department Committees

SDS.03 Mobile Application Design and Development	2013-14
SDS.02 Game Concentration	2012-13
SDS.01 Department Faculty Job Search	2011-12

College

SCS.03 NTID Faculty Council	2012-14
SCS.02 NTID Faculty Teaching and Scholarship Award Committee	2012-13
SCS.01 NTID Learning Consortium Committee	2011-13

Institute

| SIS.02 RIT Academic Senate | 2013-15 |
| SIS.01 RIT IRB Committee | 2011-14 |

Service - Professional and Community

Professional Membership

SPM.03 ACM Member	2009-Now
SPM.02 IEEE Member	2009-Now
SPM.01 USENIX Member	2009-2010

Dissertation and Thesis Committees

SDC.01 M.S. Thesis Committee Member: John Costanzo, College of Science, RIT	2013

Peer Reviews

SPR.13 CHI: ACM Conference on Human Factors in Computing Systems	2013
SPR.12 NIDRR: National Institutes of Disability and Rehabilitation Research	2013
SPR.11 ACM SRC: ACM National Student Research Competition	2013
SPR.10 SLTAT 2013: Symposium on Sign Language Translation and Avatar Technology	2013
SPR.09 CSCW: ACM Conference on Computer Supported Community Work	2013
SPR.08 RESNA: Rehabilitation Engineering Association of North America	2013
SPR.07 TACCESS: Transactions on Accessible Computing	2013
SPR.06 ACM SRC: ACM National Student Research Competition	2012
SPR.05 ASSETS: ACM Conference on Computers and Accessibility	2013
SPR.04 CHI: ACM Conference on Human Factors in Computing Systems	2012
SPR.03 ASSETS: ACM Conference on Computers and Accessibility	2013
SPR.02 RESNA: Rehabilitation Engineering Association of North America	2012
SPR.01 TACCESS: Transactions on Accessible Computing	2011

Program Committees

SPC.06 Captioning Challenge Chair, ACM SIGACCESS	2014
SPC.05 Accessibility Chair, ACM SIGACCESS	2014
SPC.04 Captioning Challenge Chair, ACM SIGACCESS	2013
SPC.03 Accessibility Chair, ACM SIGACCESS	2013
SPC.02 Symposium on Sign Language Translation and Avatar Technology	2013
SPC.01 Accessibility Chair, ACM SIGACCESS	2012

Committees

SCM.03 Committee Member, U.S. FCC Consumer Advisory Committee	2011-14
SCM.02 Technical Director, Deaf Rochester Film Festival	2011
SCM.01 Founder/Moderator, Deaf South Asians Association	1998-Now

Last updated: May 15, 2014

Curriculum Vitae

Joseph S. Stanislow

Work Address:
National Technical Institute for the Deaf
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96 Lomb Memorial Drive
Rochester, NY 14623-5604
Email: joseph.stanislow@rit.edu
Mobile: (585) 200-4237
Videophone: (585) 475-4664

Home Address:
30 Van Cortland Drive
Pittsford, NY 14534
Email: joseph.stanislow@outlook.com
Videophone: (585) 643-6716

- ## Academic and Professional Qualifications

Education

Stevens Institute of Technology, Hoboken, NJ
Degree: Master of Science, September 1999
Major: Computer Science

Rochester Institute of Technology, Rochester, NY
Degree: Bachelor of Science, May 1981
Major: Electrical Engineering Technology

National Technical Institute for the Deaf, Rochester, NY
@ Rochester Institute of Technology
Degree: Associate of Applied Science, May 1978
Major: Electro-Mechanical Technology

Relevant Professional Employment History

Full Time Faculty Position   **2000 – Present**
Information and Computing Studies Department
Rochester Institute of Technology/National Technical Institute for the Deaf, Rochester, NY

Teaching Faculty:
Information and Computing Studies Department
Developed and delivered technical courses in Associate of Applied Science (A.A.S.) and Associate of Occupational Studies (A.O.S.) level programs. Courses taught included Introduction to Programming and Computing Interfacing. Provided tutoring and student advising as needed.

Tutoring/Advising Faculty:
College of Computing and Information Science:
Tutored, advised, liaised with, and taught mainstreamed R.I.T. Deaf and Hard-of-Hearing students. Liaised with programs in the College of Computing and Information Sciences (GCCIS).
-   Provided tutoring included Programming for I.T. I, II, IIa, IIb, and III, Introduction to Multimedia, Introduction to Dbase & Data Modeling, OS Scripting, Fundamental Data Modeling, and Computer Science I.

- Assisted teaching included Programming for I.T. I and III and Introduction to Dbase & Data Modeling.

College of Engineering:
Tutored, advised, liaised with, and taught mainstreamed R.I.T. Deaf and Hard-of-Hearing students. Liaised with programs in the College of Engineering, College of Applied Science and Technology, College of Continuing Education and NTID Engineering Technology programs.
- Provided tutoring included Circuit Theory I and II, ExCiTe Intro to ECT ET, Technical Programming 1, and Digital Fundamentals.
- Lead, implemented, and developed the ECT 2+2 Matrix for new Associate Science (AS) program with Electrical Engineering Technology (EET) and Computer Engineering Technology (CET) programs.

See CV Attachment 1 – Professional Employment History for the list of courses taught/tutored.

Full Time and Co-op Engineering and Technician Corporate Positions

Software Developer   **1995 – 2000**
Innovative Desktop Solutions (IDS) Department
Avaya Inc., Holmdel, NJ
Lead Developer of the PC based test tool platform for developing and testing new telephones with new proprietary communication protocol Digital Communications Protocol (DCP) and recently Call Centre Modules/Digital Communications Protocol (CCMS/DCP) for the Internet Protocol (IP). Coordinated team effort with electrical engineer, firmware, and system test engineers. Responsibilities included the strategy, system design and development, and PC application software. Responsible for the design, coding, testing, and implementations of new test tools and functions for new telephones. Software was written primarily in Visual Basic 6.0.

Member of a team that developed new CALLMASTER VI terminal. Responsible for design, coding, testing, and implementation of user friendly software applications which utilized CALLMASTER VI for the Middletown and Denver System Test groups, Field Service (technicians) and customers. Set up a development environment consisting of a PC, switch simulation (947C Test Set), and CALLMASTER VI. The software was written in Visual Basic 4.0. Responsible for the design, development, coding, testing and implementation of the software applications.

Developed and created WISE Installation System for uninstalling several software applications. Solved some problems with the CALLMASTER VI and worked very closely with the designers to resolve issues. Worked with System Test Group, the CALLMASTER VI team members, and customers to meet and satisfy their needs. The CALLMASTER VI with software I designed is currently in production.

Awarded the Golden Pyramid Award and Customer Sales and Service Solution Gold Key Award.

Physical Designer   **1991 – 1994**
Terminals Development Department
Lucent Technologies Inc., Middletown, NJ

Performed physical design of business telephones. Worked with design team to develop new products from conception through manufacture. Worked within aggressive development schedules to produce Design For Manufacturing (DFM) and cost effective design. Constructed conceptual telephone models using Pro/Engineer 3D CAD software for human factors studies prior to test marketing and production. Proposed design improvements in fit of plastic piece parts for new line of Merlin telephones which were subsequently accepted.

Inspected and analyzed physical models for test and design evaluation ensuring Zero defects and cost reductions. Designed, developed, and fabricated test fixtures for life cycle and ease of manufacturing assemblies. Evaluated and performed electrical, mechanical, and environmental testing on prototypes and components resulting in regulatory agency compliance. Performed Printed Wiring Board (PWB) schematic capture and layout in CADNETIX.

Coordinated team effort with physical and electrical designers, Engineering Information Department (EID) for Pro/Engineer design models, and human factors group to create a comprehensive design plan. Organized, managed, and administered CAD and physical design laboratories to facilitate achievement of department objectives.

Selected as Test Engineer for OEM FAX machines. Specifically, evaluated OEM FAX machines to verify if they meet AT&T's requirements for new market product lines.

Awarded the 1994 Trailblazer Award. It acknowledged my excellent relations with Lucent customers.

Electrical Designer   **1981 – 1990**
Terminals Development Department
AT&T Bell Laboratories, Holmdel, NJ

Performed electrical design of business telephones. Worked with design team and human factors group to develop new products. Designed, developed and fabricated new Printed Wiring Boards (PWBs) then evaluated and performed electrical testing on prototypes and component. Successfully designed and tested analog/digital circuits of business telephones.

Co-op Engineering Aide   **12/1980 – 05/1981**
Card Test Development
International Business Machine Corporation, San Jose, CA

Built new card fixtures to test engineering changes for a mass storage device. Performed card testing with the use of word generators and logic analyzers. Devised test procedures and validated logic card results through simulation. Constructed wirewrap card models from schematics.

Co-op Engineering Aide   **12/1979 – 05/1980**
Test Development
International Business Machine Corporation, San Jose, CA

Assisted in design, revision, and evaluation of new mass storage devices.

Co-op Engineering Aide   **06/1978 –02/1979**
Test System Integration
International Business Machine Corporation, East Fishkill, NY
Assisted in construction, debugging, and testing of silicon chip handler machines. Debugged power supply, clutch, brake systems, cables, and switches. Developed electronic fabrication from schematics. Assembled various machine accessories, i.e. safety covers, switches, and panel doors. Reorganized and redrafted schematics. Designed and built a safety interlock system for silicon chip handler machines. Performed engineering changes on new silicon chip handler machines.

Part Time Position

Math Tutor   **1980**
National Technical Institute for the Deaf, Rochester, NY
Tutored students in the Math Learning Center and assisted in curriculum development.

Professional Certifications
- Certified CompTIA A+, Career ID: COMP001020096645, June 2010
    (The Professional A+ Certification by CompTIA, Advancing the Global IT Industry demonstrates competency as a computer technician.)
- Certified CompTIA Network+ Certification, Career ID: COMPOO1020096645, December 2010
    (The CompTIA Network+ Certification is the sign of a qualified networking professional.)

-      **Scholarship**

Grants, Awards, Scholarships, Honors, Innovations, Projects

An NTID Center on Access Technology (CAT) Projects; Lead Institutions were Rochester Institute of Technology (RIT) and National Technical Institute for the Deaf (NTID) by DeCaro, J.J. Projects Co-Supervised and Subject-Matter Expert (SME):

Theatre Captioning System (TCS) Project: Behm, G.W., Kelstone, A.B., and Stanislow, J.S. for Buckley, G.J, and DeCaro, J.J., Rochester, NY, 2014

Doorbell Light System (DLS) Project: Behm, G.W., and Stanislow, J.S., for Knigga, C.M., Rochester, NY, 2014

Programmable Sound Detector (PSD) Project (continued): Behm, G.W., Stanislow, J.S., Saber, E.S., and Bowman, R.J., Rochester, NY, 2014

Programmable Sound Detector (PSD) Project: Behm, G.W. and Stanislow, J.S. for Gallaudet University, Rochester, NY, 2014

Lab Instrument Sound Detector (LSID) Project: Behm, G.W. and Stanislow, J.S. for Gallaudet University, Rochester, NY, 2013

Modification of Notification Devices and Preparation for Manufacturing Readiness: PI-Behm, G.W. and CoPI-Stanislow, J.S. for ZVRS Corporation, Rochester, NY, 2012

Development of Working Prototypes of Z Notifier for ZVRS: PI-Behm, G.W., CoPI-Stanislow, J.S., and CoPI-Trager, B. for ZVRS Corporation, Rochester, NY, 2011

PDA / Cell Phone Notification System Project: PI-Clymer, E.W., PI-Behm, G.W., CoPI-Stanislow, J.S., and CoPI -Dannels, W.A. for Center on Access Technology, Rochester, NY, 2009.

Second Life as a Learning Tool Project: (with James Mallory, Gary Long, and Anthony Spiecker). Lead Institution is National Technical Institute for the Deaf (NTID), Rochester, NY., 2009

Faculty Evaluation and Development (FEAD) grant 2009 California Educators of the Deaf and Hard of Hearing (CAL-ED) Conference, Board meeting/ exhibit booth, CAID Council for Region 1 and Treasurer, March 6-9, 2008

Summit to Create a Cyber-Community to Advance Deaf and Hard of Hearing Individuals (DHH Cyber-Community): (with William Clymer, Dr. Jorge Diaz-Herrera, and Dr. Richard Ladner). An NTID Center on Access Technology (CAT) Funded Projects. Member of the STEM Faculty Group with Richard E. Ladner, and Caroline Solomon, Rochester, NY. June 25-28, 2008
Published DHH Cyber-Community Summary Report Final 2009.
The National Science Foundation under Award No. OCI-0749253
Available at: *http://www.ntid.rit.edu/sites/default/files/cat/SummitReport_final2009.pdf*

Remote Tutoring --Bringing Learning Closer from a Distance: (with Marie Giardino, Jeff Porter, Judy Bernhart, Christopher Cuculick, Sarah Donaldson, Sharon Rasmussen, Vicki Robinson, Mark Wambach, Julie Cammeron, and William Stratton). Provost's Learning Innovations Grant (PLIG), 2005-2006.
Available at: *http://www2.rit.edu/plig/MGiardinoProvost%27sInnovationsGrant05.pdf*

Golden Pyramid Award and Customer Sales and Service Solution Gold Key Award, Avaya Inc., 1996

1994 Trailblazer Award, Lucent Technologies, 1994

Peer-Reviewed Papers

Kushalnagar, R., Behm, G.W., Stanislow, J.S. & Gupta, V. (2014, October) The 2014 ASSETS Conference, the proposal titled, *Enhancing Caption Accessibility through simultaneous multimodal information: Visual-Tactile Captions* has been accepted, Rochester, NY. In-press. [Acceptance rate: 26%]

Stanislow, J.S., & Kushalnagar, R. (2013, March) *Adapting STEM Lectures for Culturally and Linguistically Diverse Classrooms*. In proceedings of the 2013 IEEE Integrated STEM Education Conference (ISEC), Princeton, NJ. ISBN: 978-1-4673-5624-4. DOI: 10.1109/ISECon.2013.6525229.
Available at: *http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=6525229*

Stanislow, J., & Kushalnagar, R. (2012, February) *Maximizing Content Learning for Deaf Students and English as Second Language Students.* In proceedings of the 43rd ACM Technical Symposium on Computer Science Education Conference (SIGCSE), Raleigh, NC. ISBN: 978-1-4503-1098-7. DOI: 10.1145/2157136.2157380 [Acceptance rate: 44%]
Available at:
http://dl.acm.org/citation.cfm?id=2157380&CFID=501166035&CFTOKEN=37926535

Other Publications: Abstracts, Presentations, Posters, Workshops, & Exhibits

International Conferences

Stanislow, J.S. & Trager, B.P. (2010, July) *Minimization of Conceptual Barriers: Best Practices.* Poster presented at the 2010 International Congress on the Education of the Deaf (ICED), Vancouver, B.C.

Trager, B.P. & Stanislow, J.S. (2010, July) *Utilizing Technology to Improve Comprehension of Programming Concepts among Deaf Students.* Paper presented at the International Congress on the Education of the Deaf (ICED), Vancouver, B.C.

Bellinger S., Behm, G.W. & Stanislow, J.S. (2010, July) *StepWise Method for Deaf and Hard of Hearing Students in Solving Word Problems.* Paper presented at 2010 International Congress on the Education of the Deaf (ICED), Vancouver, B.C.

Mallory, J.R., Long, G.L. & Stanislow, J.S. (2010, July) *Teaching Technology in the Virtual World of Second Life®.* Paper presented at the 2010 International Congress on the Education of the Deaf (ICED), Vancouver, B.C.

Mallory, J.R., Long, G.L., Stanislow, J.S. & Zorn, W. (2010, June) *Second Life® as a Learning Tool.* In proceedings of the 2010 Tech Symposium, Rochester, NY.
Available at: *http://www.rit.edu/ntid/vp/techsym/detail.html#W10D*

Trager, B.P. & Stanislow, J.S. (2008, June) *Instructional Software Tool: A visual-oriented learning approach to address conceptual barriers.* In proceedings of the 2008 Tech Symposium, Rochester, NY.
Available at: *http://www.rit.edu/ntid/vp/techsym/papers/2008/T9C.pdf*

National Conferences

Stanislow, J.S., Behm, G.W., & Kelly, R.R. (2014 July). *Is the Use of Multiple Classroom Technologies Problematic for Deaf/Hard-of-Hearing Students?* . In proceedings of the 2014 Association on Higher Education and Disability (AHEAD) Conference, Sacramento, CA.

Stanislow, J.S. (2011, June) *Patterns of Conceptual Problems: A Best Practices Approach for Deaf and Hard of Hearing Learners.* In proceedings of the 2011 CAID Conference, Fort Worth, TX.

Stanislow, J.S. (2011, March) *Patterns of Conceptual Problems: A Best Practices Approach for Deaf and Hard of Hearing Learners.* In proceedings of the 51st CAL-ED Conference, Norwalk, CA.

Bellinger S., Behm, G.W. & Stanislow, J.S. (2010, June) *StepWise Method for Deaf and Hard of Hearing STEM Students in Solving Word Problems*. In proceedings of the 2010 American Society for Engineering Education (ASEE) Annual Conference & Exposition, Louisville, KY.

Trager, B.P. & Stanislow, J.S. (2009, June) *Instructional Software Tool: A visual-oriented learning approach to address conceptual barriers.* In proceedings of the 2009 Convention of American Instructors of the Deaf (CAID) National Conference, Washington, DC.
Available at: *http://www.caidconference.org/2009/programschedule/abstracts.html#trager*

Beaton, C. & Stanislow, J.S. (2005, March) *Cognitive Connections with the Real World for Learning*. In proceedings of the California Educators of the Deaf and Hard of Hearing (CAL-ED) / Independently Merging Parents Associations of California Together for Deaf and Hard of Hearing Children (IMPACT) at CAL-ED/IMPACT Joint Conference, Irvine, CA.
Available at: *https://ritdml.rit.edu/handle/1850/12291*

Regional Conferences

Stanislow, J.S. & Behm, G.W. (2014 June) *Programmable Sound Detection (PSD), Poster* presented. In proceedings of the 2014 Effective Access Technology Conference (EAT), Rochester, NY. In press

Stanislow, J. and Behm, G. (2012, October) *Microcontroller Platform for the Accessibility Application Development*, In proceedings of the 2012 New York State Engineering Technology Association (NYSETA), Rochester, NY.

Stanislow, J., and Kushalnagar, R. (2012, October), *Maximizing Content Learning for English as a Second Language Students*. Poster presented at the 2012 New York State Engineering Technology Association (NYSETA), Rochester, NY.

Kushalnagar, R., and Stanislow, J. (2012, October) *Enhancing the Student-Interpreter-Teacher Team with Note-takers*, Poster presented at the 2012 New York State Engineering Technology Association (NYSETA), Rochester, NY.

Institute Presentations

Stanislow, J.S., Behm, G.W. & Gupta, V. (2014, May) *Programmable Notification Device.* Presented at the Imagine RIT: Innovation + Creativity Festival in the Gordon Field House, Rochester, NY.
Available at *http://www.rit.edu/imagine/planyourday14/exhibit.php?id=194*

Behm, G.W., Stanislow, J.S., Mondragon, A., Gupta, V. & Love, K. (2013, September) *Notification Systems for Medical Instruments.* Poster and demonstration presented at the Rosica Hall Research Festival, Rochester, NY.

Stanislow, J.S., Behm, G.W., & Love, K. (2013, September) *Notification Systems for Mobile Devices.* Poster and demonstration presented at the Rosica Hall Research Festival, Rochester, NY.

Behm, G.W. & Stanislow, J.S. (2012, November) *Wireless Notification Device for Mobile Devices.* Poster presented at the Celebration of Research {Effective Access Technology}, Rochester, NY.

Bellinger S., Behm, G.W., Stanislow, J.S. & Behm, J. (2010, May) *StepWise Method for Deaf and Hard of Hearing Students in Solving Word Problems.* Poster presented at the RIT's Faculty Institute on Teaching and Learning (FITL 2010), Rochester, NY.

Behm, G.W., Stanislow, J.S., Dannels, W., Behm, C., Poe, M. & Wolfe, S. (2010, May) *PDA / Cell Phone Notification System.* Presented at the Imagine RIT: Innovation + Creativity Festival in the Gordon Field House, Rochester, NY.

Behm, G.W., Stanislow, J.S., & Dannels, W. (2010, May) *FIRST*® (For Inspiration and Recognition of Science and Technology) Robotics *Rochester School for the Deaf (RSD) RoBoComm-X Team 3162's Robot.* Presented at the Imagine RIT: Innovation + Creativity Festival in the Fireside Lounge, Rochester, NY.

Invited Presentation, Talks, and Working Group

RIT Effective Access Technology Conference & Deaf Health Colloquium, (2013, June) RIT Inn and Conference Center, Rochester, NY, June 11, 2013.
Available at: *http://www.ntid.rit.edu/colloquium*

Faculty Focus Group from the Provost, Jeremy Haefner to share their perceptions of teaching online*,* (2011, January), Rochester, NY, January 20, 2011

Stanislow, J.S. (2010, April) *"Robotics" Workshop* presented at the remarkable Discovery Retreat in Killeen, TX for the NTID Outreach Department, Texas.

Clymer, W. Diaz-Herrera, J, & Ladner, R. (2008, June) *Summit to Create a Cyber-Community to Advance Deaf and Hard of Hearing Individuals (DHH Cyber-Community)*. An NTID Center on Access Technology (CAT) Funded Projects. Member of the STEM Faculty Group with Richard E. Ladner, and Caroline Solomon, Rochester, NY. June 25-28, 2008.
Published DHH Cyber-Community Summary Report Final 2009.
The National Science Foundation under Award No. OCI-0749253
Available at: *http://www.ntid.rit.edu/sites/default/files/cat/SummitReport_final2009.pdf*

Curriculum/Course Development/Course Taught

Curriculum Development

AAS Degree Program/Major in Mobile Application Development (MAD), Selected Committee	2014-Present
Major revision to the AOS, AAS, and AS Programs in Applied Computer Technology (ACT) – Quarter-to-Semester Conversion	2013-2014
Project Fast Forward (PFF) under Technological Education Center for Deaf and Hard-of-Hearing Students (DeafTEC) Introduction to Programming	2012
Deaf Initiative in Information Technology (DIIT) Introduction to Microsoft Visual Basic.NET Introduction to Java Programming Introduction to ASP.NET	2005-2006
Professional Fall 20051 Leave of Absence (LOA) Introduction to Microsoft Visual Basic .NET Introduction to Microsoft Visual Basic .ASP	20051

Course Development

AAS Degree Program/Major in Mobile Application Design and Development (MADD), Selected Committee	2014-Present
Major revision to the AOS and AAS Degree Programs in Applied Computer Technology (ACT) – Quarter-to-Semester Conversion	2013-2014
- NACT-150 Introduction to PC Hardware	2013-2014
- NACT-151 Windows Operating Systems	2013-2014
- NACT-251 Digital Systems Integration	2013-2014
- NACT-230 Intro to Programming (new Visual C#)	2013-2014

Significantly revised existing course materials and developed new course materials including lecture slides, practice exercises, homework assignments, quizzes, and tests for the following courses due to CURRENT TRENDS in the information and computing technology.

NACT-251 Digital Systems Integration (revised course)	2135
NACT-151 Windows Operating Systems (revised course)	2135
0805-215 PC Operating Systems (revised course)	20113
0805-350 Digital Technology Integration (revised course)	20113
0805-216 PC Hardware I (revised course)	20112
0805-217 PC Hardware II (new edition course)	20112
0805-350 Digital Technology Integration (development)	20112
0805-216 PC Hardware I (new edition course)	20111
0805-215 PC Operating Systems (revised course)	20103
0805-350 Computer Interfacing (revised course)	20103
0805-217 PC Hardware II (revised course)	20102
0805-230 Introduction to Programming (revised course)	20102
0805-216 PC Hardware I (revised course)	20101
0805-230 Introduction to Programming (revised course)	20101
0805-215 PC Operating System (new edition course)	20083
0805-350 Computing Interfacing (revised course)	20082
0805-230 Introduction to Programming (new edition course)	20082

0805-230 Introduction to Programming (new edition course)	20081
0805-350 Computer Interfacing (new revised course)	20072
0805-230 Introduction to Programming (new edition course)	20071
0805-350 Computer Interfacing (revised course)	20063
0805-398 <u>Special Topic</u>: Java Programming Language (new course)	20052
Project Fast Forward (PFF) under Technological Education Center for Deaf and Hard-of-Hearing Students (DeafTEC) Introduction to Programming (new workshop)	2012
Deaf Initiative in Information Technology (DIIT) Introduction to Microsoft Visual Basic.NET (new workshop)* Introduction to ASP.NET (new workshop)* Introduction to Java Programming (new workshop)	2005-2006
Business and Computing Technologies Support (BCTS) *0853-310 Computing Fundamentals Course (new edition course)*	*20042*

*Professional Leave of Absence (LOA) for the Deaf Initiative in Information Technology (DiiT) Project

Professional Organizations

CompTIA A+, Advancing the Global IT Industry, *Member*	2010-Present
CompTIA Network+, Advancing the Global IT Industry, *Member*	2010-Present
American Society for Engineering Education (ASEE), *Member*	2010-Present
Council of American Instructors of the Deaf (CAID), Board Member and Council Technical Advisor	2009-Present
Council of American Instructors of the Deaf (CAID), *Member*	2002-Present
Association for Computing Machinery (ACM) in Society for Information Technology Education (SITE), *Member*	2002-Present
NTID Alumni Chapter Upstate New York (NACUNY), *Member*	2001-Present
California Educators of the Deaf and Hard of Hearing (CAL-ED), *Member*	2005-2013
FIRST Robotics: *FIRST* (For Inspiration and Recognition of Science and Technology), *Member*	2009-2011
Council of American Instructors of the Deaf (CAID), Board Member and Region 1 Representative	2007-2009
Council of American Instructors of the Deaf (CAID), Board Member and Treasurer	2007-2009
National Academic Advising Association (NACADA), *Member*	2003-2007
NTID Alumni Chapter Upstate New York (NACUNY), Board Member at Large	2001-2003

Consulting with State and National Level

Trained deaf computer programmers from across the U.S. in a one-week Deaf Initiative in Technology (DiiT) Workshop in Microsoft Visual Basic .NET, Rochester, NY, June 9-13, 2008.

Trained deaf computer programmers from across the U.S. in a one-week Deaf Initiative in Technology (DiiT) Workshop in Microsoft Visual Basic .NET, Rochester, NY, November 14-18, 2005.

Service

NTID Committees

NTID Outstanding Scholarship Committee, *Member*	2009-Present
NTID Trustees Scholarship Award Committee, *Member*	2011-2014
NTID Tenure Committee, *Member*	2011-2013
Information and Computing Studies (ICS) Innovation Committee, *Member*	2009-2011
NTID's Department of Information and Computing Studies Tenure Track Search Committee, *Member*	2008-2009
NTID Faculty Congress (NFC), *At-Large then Information then Computing Studies (ICS) representative*	2001-2009
NTID's Department of Information and Computing Studies Tenure Track Search Committee, *Member*	2005-2006
Academic Potential Outreach Team, *Faculty*	2005-2006
NTID Outstanding Scholarship Committee, *Co-Chairperson*	2004-2009
NTID Steering Committee on Communication (SCC), *Member*	2004-2007
NTID's Department of Information Technology and Computing Studies Administrative Chairperson Search Committee, *Chairperson*	2004-2005
Substructure of Combined Department, *Faculty*	20041AY
NTID Outstanding Scholarship Committee, *Member*	2002-2003
NTID Equipment Priorities and Allocation Committee, *Member*	2001-2006
35th Anniversary NTID 2003 Reunion Committee, Treasurer	2001-2003

RIT-Wide Committees

Worked with Thomas B. Golisano College of Computing and Information Sciences (GCCIS) and Information Technology (IT) Departments	2000-2007
Information Sciences and Technologies MS Capstone Project Committee for Golisano College of Computing and Information Sciences, Member	20042-20043

Interdepartmental Activities

Summer Vestibule Program (SVP), Outreach Department, *Instructor*	2001-Present
TechGirlz, Outreach Department, *Instructor*	2011
Explore Your Future (EYF), Outreach Department, *Instructor*	2011
2nd National Math Competition, *Proctor*	2008
Explore Your Future (EYF), Outreach Department, *Instructor*	2005-2007

Advising for Student Organizations/Groups/Functions

NTID Geek Club (NGC), *Faculty Advisor*	2013- Present
NTID Computer Club (NCC), *Faculty Advisor*	2002-2013
Dean's Student Leadership Advisory Group (DSLAG), *Representative*	2004-2007

Contributions to the Community

Consulting for Local Organizations & Groups

Co-founded, launched, and implemented Rochester School for the Deaf *FIRST* (For Inspiration and Recognition of Science and Technology) RoBoComm-X Team 3162	2009-2011
NTID Alumni Chapter of Upstate New York (NACUNY)	2001-2010

Greater Rochester Deaf Golf Association (GRDGA)	2004-2009
RIT Golf League	2004-2006
U.S. Deaf Golf Championships (USDGC) Committee	2004-2005
7th Annual NTID Alumni Golf Tournament Committee	2004-2005
Deaf Girls of Rochester – assisted in their activities	2001-2006
Deaf Boys of Rochester – assisted in their activities	2001-2006
NTID Alumni Golf Tournament	2003-2005
RIT Golf League	2003-2004
NTID Alumni Chapter of Upstate New York (NACUNY) as Member at Large	2001-2003

Community Activities:

Co-Coach for 3nd National Math Competition for the BOCES #1's team of four   2009
  − 4th place: BOCES #1 Team.

Facilitator for 2009 NTID National Science Fair for Deaf and Hard-of-Hearing   2009
Students,
  − Middle School Division – 2nd place: Sarah Stanislow and Hope Basille,
    7th grade, Barker Road Middle School, Pittsford, N.Y for "Solvents and
    Stains"

Facilitator for 2008 NTID National Science Fair for Deaf and Hard-of-Hearing   2008
Students
  − Middle School Division - 1st place: Sarah Stanislow, 6th grade, Barker
    Road Middle School, Pittsford, N.Y. For "Does the Insulation Really
    Work?"

Invited Presentation for Rochester Deaf Rotary Club   2008
  − Presented my fabulous West Trip to and received the Certificate of
    Appreciation

Committee for 8th Annual NTID Golf Tournament   2007

Volunteer for Camp Mark Seven (Camp for the Deaf and Hard of Hearing)   2007-2010
  − Assisted in the efforts necessary for the opening and closing of the
    camp.

Committee and Facilitator for Deaf Boys of Rochester   2002-2006
Committee and Facilitator for Deaf Girls of Rochester   2002-2006

Other:
Developed, designed and maintained three websites:
1. CAID Organization and Conference website   2007-Present
2. *FIRST*$^{®}$ (For Inspiration and Recognition of Science and Technology)   2009-2011
   RoBoComm-X Team 3162 website for Rochester School for the Deaf
   (RSD).
3. Rochester School for the Deaf Alumni Association (RSDAA) website.   2008-2010

CV Attachment 1 – Professional Employment History

Course Taught/Tutored (Activities in Primary Areas of Job Responsibility)

Teaching:

NACT-151 Windows Operating Systems (two sections)	2135
NACT-251 Digital Systems Integration	2135
NACT-150 Introduction to PC Hardware (two sections)	2131
NACT-151 Windows Operating Systems	2131
0805-215 PC Operating Systems	2123
0805-350 Digital Technology Integration (two sections)	2123
0805-217 PC Hardware II	2122
0805-230 Intro to Programming	2122
0805-216 PC Hardware I (two sections)	2121
0805-215 PC Operating Systems	2121
0805-215 PC Operating Systems	2113
0805-350 Digital Technology Integration (two sections)	2113
0805-217 PC Hardware I	2112
0805-217 PC Hardware II	2112
0805-217 PC Hardware I (three sections)	2111
0805-215 PC Operating Systems (two sections)	2103
0805-350 Computer Interfacing	2103
0805-217 PC Hardware II (two sections)	2102
0805-230 Introduction to Programming	2102
0805-216 PC Hardware I	2101
0805-230 Introduction to Programming (two sections)	2101
0805-215 PC Operating Systems	2093
0805-251-Web Development I (two sections)	2093
0805-216 PC Hardware II (two sections)	2092
0805-230 Introduction to Programming	2092
0805-216 PC Hardware I (two sections)	2091
0805-230 Introduction to Programming (two sections)	2091
0805-217 PC Hardware II	2083
0805-215 PC Operating Systems (two sections)	2083
0805-216 PC Hardware I (two sections)	2082
0805-217 PC Hardware II	2082
0805-216 PC Hardware I	2081
0805-230 Introduction to Programming (two sections)	2081
0805-350 Computer Interfacing (two sections)	2073
0805-230 Programming I	2072
0805-230 Programming I (two sections)	2071
0805-398 Special Topics: Java Programming Language	20052
Professional Leave of Absence (LOA) for the Deaf Initiative in Information Technology (DiiT) Project	20051
0805-398 Special Topics: Java Programming Language	20042
0853-310 Computing Fundamentals course	20041
0853-310 Computing Fundamentals course	20033
0853-310 Computing Fundamentals course	20023
0805-230 Programming I	20021

0853-310 Computing Fundamentals course	20013
0853-310 Computing Fundamentals course	20003

Co-teaching IT courses with supported sections:

4002-360 Introduction to Dbase and Data Model, Kevin Bierre.	20063
4002-217 Programming for I.T. I	20062
4002-219 Programming for I.T. III	20061
0853-310 Computing Fundamentals course	20021
0853-310 Computing Fundamentals course	20011
0853-310 Computing Fundamentals course	20001
4002-217 Introduction to Programming I course, Bryan French	20053
4002-218 Introduction to Programming II course, Pete Lutz	20053
4002-218 Introduction to Programming II course, Steve Zilora	20052
4002-217 Introduction to Programming I course, Bryan French.	20042
4002-221 Introduction to Programming IIb course with Keith Whittington.	20033
4002-221 Introduction to Programming IIa course with Keith Whittington.	20032
4002-219 Introduction to Programming III course with Michael Flosser.	20031
4002-221 Introduction to Programming IIb course with Keith Whittington.	20023
4002-217 Introduction to Programming I course with Steve Zilora.	20022
4002-220 Introduction to Programming IIa course with Keith Whittington.	20022
4002-217 Introduction to Programming I course with Edward Holden.	20021
4002-217 Introduction to Programming I course with Anne Haake.	20013
4002-217 Introduction to Programming I course with Keith Whittington.	20012
4002-217 Introduction to Programming I course with Larry Hill.	20012
0602-215 Introduction to Visual Programming I Studio with Perez-Hardy.	20003
0602-215 Laboratory for Visual Programming I as the lab assistant.	20002

Tutoring:

0609-214 Circuit Theory I
0609-215 Circuit Theory II
0618-213 ExCiTe Intro to ECT ET
0618-231 Technical Programming 1
0618-301 Digital Fundamentals
4002-217 Introduction to Programming I
4002-218 Introduction to Programming II
4002-220 Introduction to Programming IIa
4002-221 Introduction to Programming IIb
4002-219 Introduction to Programming III
4002-320 Introduction to Multimedia
4002-360 Introduction to Dbase & Data Modeling
4002-402 OS Scripting
4002-461 Fundamental Data Modeling
4002-217 Introduction to Programming I
4002-218 Introduction to Programming II
4002-220 Introduction to Programming IIa
4002-221 Introduction to Programming IIb
4002-219 Introduction to Programming III
4002-320 Introduction to Multimedia
4002-340 Computer Concepts and Software Systems

4002-341 Data Communications and Computer Networks
4002-342 Internetworking Laboratory
4002-402 OS Scripting
4003-231 Computer Science 1
0112-360 MIS Hardware and Operating System Architecture (3)
0112-335 MIS Visual Basic/GUI Design (3)
0602-340 Computer Concepts and Software Systems
0602-341 Data Communications and Computer Networks
0602-215 Laboratory for Visual Programming I
0602-215 Introduction to Visual Programming I
0602-320 Introduction to Multimedia
0602-342 Internetworking Laboratory

Brian P. Trager

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Mobile: 585-615-0964
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I. ACADEMIC AND PROFESSIONAL QUALIFICATIONS

EDUCATION

M.S. in Information Technology   **2005**
Rochester Institute of Technology, Rochester, N.Y.
Areas of Concentration: Instructional Technology, Multimedia and Web Development

B.S. in Business Administration – Marketing   **2000**
Rochester Institute of Technology, Rochester, N.Y

RELEVANT PROFESSIONAL EMPLOYMENT HISTORY

Assistant Professor   **2003 – Present**
Rochester Institute of Technology/National Technical Institute for the Deaf
Information & Computing Studies, Rochester, N.Y.
Hired as a visiting instructor for the NTID Business & Computing Technology Support team with the primary responsibility of tutoring deaf students in Information Technology. Was hired in a tenure-track position in the Information Computing Studies to tutor and teach a variety of courses to deaf students in areas of Java programming, Web development, database and multimedia. Developed syllabus and overall course structure, and administered all grades. Faculty positions within NTID have included: Assistant Professor (2011 – present), Instructor (2006 – 2011), Visiting Instructor (2003-2006).

COMMUNICATION SKILLS

Sign Language

Advanced Plus to Superior Plus SCPI rating achieved   2006

PROFESSIONAL DEVELOPMENT

Conferences

- Microsoft TechEd North America 2012 Conference, June 6 – 10, 2012
- Society of Information Technology & Teacher Education Conference, 2011, March 8 -12, 2011
- Special Interest Group in Computer Science Education (SIGCSE) Conference 2010, March 10-13, 2010
- AFCOM Spring 2009 Data World Conference, March 8 – 12, 2009
- Society on Information Technology and Teacher Education (SITE) Conference 2011, March 8-12, 2011

II. PROFESSIONAL ACTIVITIES & SCHOLARSHIP

GRANTS, AWARDS, SCHOLARSHIPS, HONORS

Android Development Collaboration with VL2 (VL2 ADC Project), Co-PI, Sponsored Research Services, 2013, $48,000

Classroom Research for Preliminary Findings: Use of SLIM to Teach Content Areas to RIT/NTID Students, Co-PI, NTID Research Center for Teaching and Learning, 2012, $8,400

Empowering Mainstreamed Deaf and Hard-of-Hearing Students with Personal Multiple View Perspectives, PI, NTID 2010 Innovation Funding Award, 2011, $76,922

See-Through Monitor Project, Co-PI, NTID 2010 Innovation Funding Award, 2011, $62,828

PUBLICATIONS

Kushalnagar, R., Trager, B., & Beiter, K. (2013). **Assistive View Replay for Deaf Students**. *Proceedings of RESNA Conference 2013.* *(http://web.resna.org/conference/proceedings/2012/PDFs/Scientific/Cognitive/ASSISTIVEVIEWREPLAYFORDEAFSTUDENTS.pdf)*

Kushalnagar, R. & Trager, B. (2011). **Improving Classroom Visual Accessibility with Cooperative Smartphone Recordings.** *Proceedings of IEEE International Symposium on Technology and Society 2011.*

Trager, B. & Kushalnagar, R. (2011). **Efficacy of a Direct Learning Tool for Deaf and Hard of Hearing Students.** *Proceedings of Society for Information Technology & Teacher Education International Conference 2011* (pp. 3667-3673). Chesapeake, VA: AACE. Retrieved from *http://www.editlib.org/p/36894*. [32% acceptance rate]

PRESENTATIONS, PAPERS, WORKSHOPS, EXHIBITS

International Conference

Kurz, C., Behm, G., Trager, B., Ali, S. (2014). **Recent Developments of Real-time Interactive Video Access System (RIVA).** Poster presented at the 16th International ASSETS Conference Reception and Showcase at RIT, Rochester, NY.

Trager, B. & Stanislow, J (July 2010). **Utilizing Technology to improve comprehension of programming concepts among Deaf students.** Paper presented at the International Congress on the Education of the Deaf Conference 2010, Vancouver, B.C.

Trager, B. & Stanislow, J (July 2010). **Minimization of Conceptual Barriers: Best Practices.** Poster presented at the International Congress on the Education of the Deaf Conference 2010, Vancouver, B.C.

Trager, B. & Stanislow, J (2008). **Instructional Software Tool: A visual learning approach to conceptual barriers.** Proceedings of 2008 Technology and Deaf Education, Exploring Instructional and Access Technologies: An International Symposium. Jun 23-25, 2010. Rochester, N.Y.
Available at: *http://www.rit.edu/ntid/vp/techsym/papers/2008/T9C.pdf*

National Conference

Trager, B., Behm, G., & Kurz, C. (2013). **SLIM: See-Through, Life-Size Interactive Monitor.** Presented at the 2013 Convention of American instructors for the Deaf conference, Rochester, NY.

Trager, B.P. and Kushalnagar, R.S. (March 2011). **Impact of Direct Tutoring that utilizes visual learning and translations for Deaf Students**: Poster presented at SIGCSE 2011: 42nd ACM Special Interest Group in Computer Science Education, Dallas, TX.

Trager, B. & Stanislow, J (June 2009). **Instructional Software Tool: A visual-oriented learning approach to conceptual barriers.** Paper presented at the Council of American Instructors of the Deaf 2009 National Conference, Gallaudet University, Washington, D.C.

Regional Conference

Kurz, C., Trager, B., & Behm, G. (2013). **Consolidating Multi-media in the See-Through Life-Size Interactive Monitor Technology.** Poster Session at the 2013 Effective Access Technology conference, Rochester, NY.

Trager, B. (March, 18 2011). **Direct Learning Tutoring Tool for Deaf and Hard of Hearing Students.** Presented at the Teaching and Learning with Technology Symposium, Education Technology Day 2011 at Ithaca College, Ithaca, NY.

Campus Presentations

Kushalnagar, R.S. & Trager, B. (May 2011). **Multiple Video Recordings: Universal Access for NTID Supported Classroom Recordings.** Presented at the Faculty Institute of Teaching and Learning Conference 2011, Rochester, NY.

Trager, B. & Kushalnagar, R.S. (May 2011). **Efficacy of a Direct Learning Tutoring Tool for Deaf and Hard of Hearing Students.** Presented at the Faculty Institute of Teaching and Learning Conference 2011, Rochester, NY.

Trager, B. (May 2011). **"Academic Support Service Panel".** Presented to the NTID National Advisory Group at National Technical Institute for the Deaf, Rochester, N.Y. (Invited)

Trager, B. (October 2008). **"Providing instruction to deaf and hard of hearing students pursuing baccalaureate degrees: Today and in the Future".** Presented to the NTID National Advisory Group at National Technical Institute for the Deaf, Rochester, N.Y. (Invited)

Invited Presentation

Trager, Brian (July 2011). **Academic Career in Computing.** Summer Academy 2010 at University of Washington, Seattle, WA.

CURRICULUM, COURSE DEVELOPMENT, INSTRUCTIONAL MATERIALS

Course Development

Significantly revised existing course materials and developed new course materials including lecture slides, practice exercises, assignments, quizzes, and tests for the following courses.

Networking Essentials (new course)	2005-1
Programming Fundamentals (revised course)	2007-1
Web Server Technologies (revised course)	2007-3
Web Development I (revised course)	2009-2
Programming Fundamentals (revised course)	2010-1
Windows Phone App Development	2012-3
*Programming Fundamentals I**	2013-1
*Programming Fundamentals II***	2013-1
*Website Development***	2013-1
*Website Implementation***	2013-1

* - Conversion from Quarter to Semester
** - New courses for Semester

Special Topics Course

Taught and developed materials for a special topics course in *Windows Phone App Development* to teach students on creating apps for the Windows Phone platform. This will be offered a second time in Spring Semester 2014 due to popular demand.

Taught and developed materials for a special topics course in *Introduction to Windows Vista* during Winter Quarter 062. Course was designed to enable students to meet the anticipated job market demand for skills in the Windows Vista operating system.

Curriculum Development

Information & Computing Studies AS Program for Semester Conversion   2013

Co-authored a program proposal for an Associate of Science Degree in Applied Computer Technology. Approved by the NTID Curriculum Committee and the Institute Curriculum Committee in 2011. Negotiated a formal transfer agreement with GCCIS's Information Technology Department.

WORKSHOP

PHP 6 & MySQL 5 Workshop Presenter   July 13 – 17, 2009

Trained deaf computer programmers from across the U.S. in a one-week Deaf Initiative in Technology workshop covering basic & intermediate level PHP scripting and foundations of MySQL. (Workshop held at NTID)

PROFESSIONAL ORGANIZATIONS

Council of American Instructors of the Deaf (CAID)	2009 – 2013
Rehabilitation Engineering and Assistive Technology Society of North America (RESNA)	2013
ACM, Special Interest Group in Computer Science Education (SIGCSE)	2010 – 2011
Society of Information Technology & Teacher Education (SITE)	2011

MENTORING

Project Fast Forward Teacher Consultant   2009-2012
Train and consult individuals in New York, Indiana and North Carolina with Web Development I and PC Hardware courses.

CONSULTANT WORK – STATE/NATIONAL LEVEL

Web/Marketing Consultant, Awti Productions (www.awtiproductions.com)   2008-2010

III. CONTRIBUTIONS TO THE INSTITUTE

INSTITUTE AND COLLEGE COMMITTEES

NTID Innovation, Scholarship, and Research Committee, *Member*	2010 – present
NTID Faculty Congress, *currently Co-Chair*	2008-present
NTID Equipment Review Committee, *Member*	2008-present
NTID Web Advisory Committee, *Member*	2008-present
NTID Innovation Funding Committee, *Member*	2010-2011
NTID Marketing Communications Web Developer Search Committee, *Member*	2009-2010
Information & Computing Studies Tenure Track Search Committee, *Member*	2007-2009
Information & Computing Studies Social Events Committee, *Member*	2008-2009

INTERDEPARTMENTAL ACTIVITIES

Summer Vestibule Program, Outreach Department, *Instructor & Coordinator* *	2005-present
* - *Coordinator for ICS in 2010 & 2011*	
TechGirlz, Outreach Department, *Instructor*	2008 – present
Step to Success, Outreach Department, *Instructor*	2008 – 2010
Explore Your Future, Outreach Department, *Instructor*	2007 – 2009
Information Technology, In-service Training, Department of Access Services, *Instructor*	2009
NTID Math Competition, *Proctor*	2009
History of Computers, Career Exploration Studies, *Guest Speaker*	2008
The Future of Technology, Career Exploration Studies , *Guest Speaker*	2009 – 2010

ADVISING CONTRIBUTIONS

NTID Geek Club Faculty Advisor	2006 – present

Support and gave advice to more than 30 deaf and hard-of-hearing students in the club with strong interest in computers and future technologies.

Big Brother/Big Sister Advisor, Information & Computing Studies Dept.	2009 – 2010

As part of student retention efforts, I serve as advisor to encourage 2nd and 3rd year students to mentor 1st year students. I worked with other advisors to coordinate several events to promote social interactions among ICS students in this program.

OTHER CONTRIBUTIONS

Golisano Lab Manager, ICS Department	2008 – 2011

IV. CONTRIBUTIONS TO THE COMMUNITY

CONSULTANT WORK FOR LOCAL ORGANIZATIONS

Pro Bono: Milestone Months (milestonemonths.com), Web Developer & Consultant	2010-present
Pro Bono: HapiBelli Deli, Web Developer	2006-2007

LOCAL COMMUNITY PRESENTATIONS

"Secrets of Windows Vista", *Presenter*	April 25, 2008
"Upgrade Your Future", *Presenter*	May 9, 2007
"A Sneak Peek into Windows Vista", *Presenter*	November 1, 2006

COMMUNITY VOLUNTEER ACTIVITIES

Rush Henrietta Athletic Association T-Ball League, *Assistant Coach*	2011
Rochester Deaf Golf League (Wildwood), *Webmaster*	2009
40th NTID Alumni Reunion Registration Committee, *Chairperson*	2007-2008
NTID Alumni Golf Tournament Committee, *Member*	2007
Rochester Deaf Sports Organization, *Webmaster*	2003-2005
Taught evening sign language class at Victory Baptist Church	2001
Rochester Boys and Girls Club, *Volunteer*	2000

Appendix G – Cost Model: Revenue/Cost Projections/Expenses

The NTD cost model analysis prepared by Mr. Steven Morse, the Assistant Vice-President for NTID Finance and Budget includes four tables detailing projected expenditures and revenue over the first five years of the program. There are no anticipated capital expenditures.

Table 1 below shows the projected expenditures for each of the first five years of the proposed program. These expenditures include faculty/staff salary and benefits plus costs such as computers, instructional supplies, telephone, software licenses, travel/conferences, tuition payment for RIT credits and RIT indirect costs. The grand total costs, which total $605,500 in Year 5, include the incremental cost of 1 FTE Lecturer to be hired in AY2017-18 to teach courses in other ICS programs that would have been taught by faculty now assigned to teach in the Mobile Application Development program.

Table 1 – Projected Expenditures

Information and Computing Studies Department
Mobile Application Development Associate of Applied Science Degree Program
Projected Expenditures For The Proposed Program
Table 1

		Year 1 AY16-17	Year 2 AY17-18	Year 3 AY18-19	Year 4 AY19-20	Year 5 AY20-21
Faculty Positions (2.67 FTE) - Salary		$ 188,400	$ 194,100	$ 199,900	$ 205,900	$ 212,100
Staff Assistant (0.05 FTE) - Salary		$ 2,300	$ 2,400	$ 2,500	$ 2,600	$ 2,700
Benefits		$ 72,000	$ 77,000	$ 81,000	$ 85,000	$ 88,000
Total Salary and Benefits		**$ 262,700**	**$ 273,500**	**$ 283,400**	**$ 293,500**	**$ 302,800**
Additional 1.0 FTE Required for Home Dept.	**Salary & Benefits**	**$ -**	**$ 80,000**	**$ 83,000**	**$ 86,100**	**$ 89,400**
Computer Charges		$ 18,600	$ 31,400	$ 37,400	$ 38,500	$ 39,600
Instructional Supplies		$ 2,000	$ 2,100	$ 2,200	$ 2,300	$ 2,400
Telephone		$ 700	$ 700	$ 700	$ 700	$ 700
Software Licenses		$ 2,000	$ 2,100	$ 2,200	$ 2,300	$ 2,400
Travel-Conferences		$ 2,900	$ 2,900	$ 2,900	$ 2,900	$ 2,900
Tuition Payments for RIT Credits *		$ 39,000	$ 62,500	$ 74,700	$ 77,000	$ 79,300
Overhead (RIT Indirect Costs)		$ 65,600	$ 75,000	$ 80,700	$ 83,400	$ 86,000
Other		**$ 130,800**	**$ 176,700**	**$ 200,800**	**$ 207,100**	**$ 213,300**
New Program Total Costs		**$ 393,500**	**$ 450,200**	**$ 484,200**	**$ 500,600**	**$ 516,100**
Grand Total Costs to NTID (including Additioanl 1.0 FTE)		**$ 393,500**	**$ 530,200**	**$ 567,200**	**$ 586,700**	**$ 605,500**

* This dollar amount represents the charge for NTID students taking classes in CLA at the CLA specific rate per credit hour. These CLA classes yield a faculty requirement of 0.25 FTE starting in Year 3 and forward provided that no seats are available in existing class sections. Year 1 and Year 2 require a lesser faculty FTE requirement based on the years in which these classes occur. The 0.25 FTE is calculated as follows (10 incremental students x 6 classes = 60 seats; 60 seats / 30 seat average class size = 2 classes; 2 classes / 8 classes per year for lecturer faculty member = 0.25 FTE).

Table 2 below shows the projected revenue for each of the first five years of the program. Again, this assumes an enrollment of 12 students per year, with 10 persisting into the second year for a total of 22 students. We anticipate 9 of the 10 persisting students will continue into the third year for a total of 31 students in the fall semester of the third year. Because 9 students will complete the program after the fall semester of the third year, only 22 will be enrolled into the spring semester of the third year. These enrollment projections have been reviewed and approved by the Jim Miller, Senior VP of Enrollment Management and Career Services at RIT. Each year, 10 of the projected 12 incoming students will be new to NTID, resulting in incremental tuition revenue of $150,400 in Year 1 and $422,839 by Year 5. Projected revenue also includes Federal Appropriations which NTID uses to offset costs not covered by tuition.

Table 2 – Projected Revenue

Information and Computing Studies Department
Mobile Application Development Associate of Science Degree Program
Projected Revenue For The Proposed Program
Table 2

	Year 1 AY16-17	Year 2 AY17-18	Year 3 AY18-19	Year 4 AY19-20	Year 5 AY20-21
Total Fall Semester Enrollment	12	22	31	31	31
Total Spring Semester Enrollment	12	22	22	22	22
Total Students' Semesters of Enrollment *	24	44	53	53	53
Incremental Students' Semesters of Enrollment *	20	40	49	49	49
Semester Tuition Rate	$ 7,520	$ 7,783	$ 8,056	$ 8,338	$ 8,629
Total Student NTID Tuition Revenue *	$ 180,480	$ 342,461	$ 426,947	$ 441,891	$ 457,357
Incremental Student NTID Tuition Revenue *	150,400	311,328	394,725	408,540	422,839
State Revenue	$0	$0	$0	$0	$0
Federal Appropriation ~	$ 213,020	$ 187,739	$ 140,253	$ 144,809	$ 148,143
Federal Appropriation - Incremental ~ ^	$ 243,100	$ 218,872	$ 172,475	$ 178,160	$ 182,661
Grand Total Revenue	$ 393,500	$ 530,200	$ 567,200	$ 586,700	$ 605,500
Incremental Grand Total Revenue	393,500	530,200	567,200	586,700	605,500

* Total students are all NTID students who will participate in this new program; this includes some existing NTID students, but mostly incremental students. Incremental students are students who will attend NTID specifically to participate in this new program. Therefore, total student enrollment and tuition revenue are projected to be greater than incremental student enrollment and tuition revenue.

~ Both Federal Appropriation amounts include the amount calculated as additional salary and benefit costs to NTID for hiring 1.0 FTE Lecturer for the home department starting in Year 2 to cover department courses which would have previously been taught by faculty teaching in this new program.

^ The Federal Appropriation increased by the amount the NTID Tuition Revenue decreased under the Incremental Student Scenario

Table 3 shows the projected capital expenditures. A Mobile Application Development lab is part of the space design for pending move of the ICS department from the Carey building to the LBJ building. Because the lab and the facilities for the lab are already included as part of the design, equipment, and facilities costs, there are no projected capital expenditures. (See letter of support in Appendix E from Erwin Smith, Assistant Vice President for Information Technology and College Operations dated 10/24/2014).

Table 3 – Projected Capital Expenditures

Information and Computing Studies Department
Mobile Application Development Associate of Applied Science Degree
Projected Capital Expenditures
Table 3

	Year 1 AY16-17	Year 2 AY17-18	Year 3 AY18-19	Year 4 AY19-20	Year 5 AY20-21
Capital Facilities	$0	$0	$0	$0	$0
Equipment	$0	$0	$0	$0	$0
Total Capital Expenditures	$0	$0	$0	$0	$0

Additional equipment to support this program is not required. As with all programs there will be needs for exisiting equipment to be upgraded as technology develops. This expense will be supported through existing NTID policies and funded through current operating budgets.

New facilities, such as laboratories, will not be required for this program.

11/14/2014   Mobile App Design and Development Program Costs 11.2014.xlsx

Table 4 shows a summary of the program expenditures, revenue and resource requirements for the new Mobile Application Development program.

Table 4 – Summary of Program Expenditures, revenue and Resource Requirements

Information and Computing Studies Department
Mobile Application Development Associate of Applied Science Degree Program
Summary of Program Expenditures, Revenue, and Resource Requirements
Table 4

	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	Total
Personnel	$ 190,700	$ 196,500	$ 202,400	$ 208,500	$ 214,800	$ 1,012,900
Benefits	$ 72,000	$ 77,000	$ 81,000	$ 85,000	$ 88,000	$ 403,000
Additional Salary & Benefits for 1.0 FTE Lecturer. This hire is required by the home department to teach other department courses (unrelated to this new program) starting in year 2 (2017-2018) which previously would have been taught by faculty teaching in this new program.	$ -	$ 80,000	$ 83,000	$ 86,100	$ 89,400	$ 338,500
Computer Charges	$ 18,600	$ 31,400	$ 37,400	$ 38,500	$ 39,600	$ 165,500
Instructional Supplies	$ 2,000	$ 2,100	$ 2,200	$ 2,300	$ 2,400	$ 11,000
Telephone	$ 700	$ 700	$ 700	$ 700	$ 700	$ 3,500
Software Licenses	$ 2,000	$ 2,100	$ 2,200	$ 2,300	$ 2,400	$ 11,000
Travel-Conferences	$ 2,900	$ 2,900	$ 2,900	$ 2,900	$ 2,900	$ 14,500
Tuition Payments for RIT Credits	$ 39,000	$ 62,500	$ 74,700	$ 77,000	$ 79,300	$ 332,500
Expense	$ 327,900	$ 455,200	$ 486,500	$ 503,300	$ 519,500	$ 2,292,400
Overhead (RIT Indirect Costs)	$ 65,600	$ 75,000	$ 80,700	$ 83,400	$ 86,000	$ 390,700
Total Expense	$ 393,500	$ 530,200	$ 567,200	$ 586,700	$ 605,500	$ 2,683,100
Enrollment * ^	12	22	31	31	31	127
Tution ^	$ 180,480	$ 342,461	$ 426,947	$ 441,891	$ 457,357	$ 1,849,135
Federal Appropriation ^	$ 213,020	$ 187,739	$ 140,253	$ 144,809	$ 148,143	$ 833,965
Total Revenue	$ 393,500	$ 530,200	$ 567,200	$ 586,700	$ 605,500	$ 2,683,100
Total Rev. – Total Exp.	$ -	$ -	$ -	$ -	$ -	$ -

* Reviewed by RIT Enrollment Management & Career Services (Jim Miller)

^ These numbers are based on total projected students for this program (which is shown here on the enrollment line). As shown on Table 2 - Projected Revenue for the Proposed Program, incremental students' semesters of enrollment is slightly less than total students' semesters of enrollment. Consequently, incremental students' NTID tuition revenue is less than total students' NTID tuition revenue. Also as shown on Table 2, grand total revenue and incremental grand total revenue are the same amount. This is as a result of the flexibility that NTID has to utilize its Federal Approriation. Therefore, utilizing these total student amounts on Table 4 instead of utilizing the slightly lesser incremental amounts is considered inconsequetial as it relates to this analysis.