Manufacturing and Mechanical Systems Integration (MMSI)

Dr. Martin K. Anselm, MMSI Graduate Director

www.RIT.edu/MMSI
Manufacturing and Mechanical Systems Integration (MMSI)

Outcomes

- Nearly 100% job or further graduate studies outcomes for our graduates
- Median first-year salary; $75k, 2019
- Job Titles: Associate Quality Engineer, Operations Test Engineer, Mechanical Engineer, Field Sales Engineer, Process Engineer

Admissions Requirements (in part)

- Bachelors degree (or equivalent) in the field of engineering, engineering technology, or computing
- Minimum cumulative GPA of 3.0 (or equivalent)

Exit Requirements (in part)

- Thesis or Capstone (Comprehensive exam option)
- 3.0 GPA in 33 credits upon graduation

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Curriculum

Concentrations

- Advanced Mechanics
- Electronics Packaging
- Polymer Engineering & Technology
- Product Design
- Robotics and Advanced Manufacturing Systems
- Quality

Customization

- Blend of concentrations
- Selection of research topic
- Capstone on co-op
Agenda

- Why? & Career Opportunities
- Curriculum
  - Research: Faculty & Effort
- Admission & Exit Requirements
- Timeline
## Salaries

<table>
<thead>
<tr>
<th>UG in MET</th>
<th>~$60,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS in MMSI</td>
<td>~$75,000</td>
</tr>
</tbody>
</table>

### UG Job Titles

- Nearly 100% had Engineer in title but some included terms like:
  - Entry level
  - Aid
  - Associate
  - Jr.
  - Trainee

### Grad Job Titles

- Similar titles but some included terms like:
  - Manager
  - Supervisor
  - Owner
  - Founder
  - Senior
  - Operations leadership
  - Specialist

<table>
<thead>
<tr>
<th>Applications Engineer</th>
<th>Mechanical Engineer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation Engineer</td>
<td>Process Engineer</td>
</tr>
<tr>
<td>Controls Systems Engineer</td>
<td>Product Development Engineer</td>
</tr>
<tr>
<td>Design Engineer</td>
<td>Project Supply Chain Manager</td>
</tr>
<tr>
<td>Lean Manufacturing Engineer</td>
<td>Quality Control Senior Supervisor</td>
</tr>
<tr>
<td>Manager, Continuous Improvement Quality Engineer</td>
<td></td>
</tr>
<tr>
<td>Manufacturing and Production Engineer</td>
<td>R &amp; D Engineer</td>
</tr>
<tr>
<td>Manufacturing Engineer</td>
<td>Senior Manufacturing Engineer</td>
</tr>
<tr>
<td>Technical Program Manager</td>
<td></td>
</tr>
</tbody>
</table>
Curriculum
## MS - Manufacturing and Mechanical System Integration (MMSI)

<table>
<thead>
<tr>
<th>Graduate Education Requirements</th>
<th>Core Requirements</th>
<th>Concentration Requirements (Choose 1 Set)</th>
<th>Electives</th>
<th>Exit Requirements</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Courses</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td># of Credits</td>
<td>3</td>
<td>12</td>
<td>9</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>1 MFET600 (F) - Graduate Seminar</td>
<td></td>
<td>CAST-MFET-650 (F) Manufacturing and Mechanical Systems Fundamentals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 COS-STAT-670 (S) Design of Experiments for Engineers and Scientists</td>
<td></td>
<td>CAST-MFET-730 (S) Six Sigma for Design and Manufacturing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SCB-ACCT-706 (F, S) Cost Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SCB-DECS-744 (F, S) Project Management</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Courses from any other concentration or Technical courses approved by the graduate advisor
- Capstone or Thesis or Exam
### Concentrations

#### Robotics and Advanced Manufacturing Systems

<table>
<thead>
<tr>
<th>Robotics &amp; Automation (Pick 3)</th>
<th>Surface Mount Electronics Manufacturing (pick 3)</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAST-MFET-670 (F, S) Controls for Manufacturing</td>
<td>CAST-MFET-655 (F) Surface Mount Electronics Manufacturing</td>
<td>COS-STAT-621 (F) Statistical Quality Control</td>
</tr>
<tr>
<td>CAST-MFET-685 (F,S) Robots and CNC in Int. Manufacturing</td>
<td>CAST-TCET-740 (F) Fiber-Optic Telecommunications Technology</td>
<td>COS-STAT-641 (F, S) Applied Linear Models - Regression</td>
</tr>
<tr>
<td>TCET-620 (S) Machine Learning</td>
<td>COS-MTSE-601 (F) Materials Science</td>
<td></td>
</tr>
</tbody>
</table>
## Concentrations

### Advanced Mechanics and Materials

<table>
<thead>
<tr>
<th>Advanced Mechanics</th>
<th>Polymer Engineering &amp; Technology (pick 3)</th>
<th>Product Design (pick 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCET-695 (F) Applied Finite Element Analysis</td>
<td>MCET-730 (F) Polymer Engineering Research Fundamentals (required)</td>
<td>CAST-MCET-620 (F) Robust Design &amp; Production Systems</td>
</tr>
<tr>
<td></td>
<td>MTSE-702 (S) Polymer Science</td>
<td>MCET-683 (S) Plastics Product Design</td>
</tr>
</tbody>
</table>
## Exit Requirements

<table>
<thead>
<tr>
<th>Capstone Track</th>
<th>Thesis Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAST-MFET-797 (3 Credits)</td>
<td>CAST-MFET-788 (3 Credits)</td>
</tr>
<tr>
<td>MMSI Capstone Project</td>
<td>Thesis Planning</td>
</tr>
<tr>
<td>1 Additional Elective Course (3 Credits)</td>
<td>CAST-MFET-790 (3 Credits)</td>
</tr>
<tr>
<td></td>
<td>Thesis</td>
</tr>
</tbody>
</table>

Comprehensive Exam Option
Research: Faculty & Effort
Professor Research Concentrations

Fluid Dynamics

Spray Physics

Advanced Mechanics

Polymers

Respiratory disease is the leading cause of death in children under five.

9 million deaths annually worldwide

Billions of dollars in cost annually to the U.S.

Electronics Mfg.

Robotics

Jet Nebulizer
Professors

- Dr. Anselm – Electronics Manufacturing
- Dr. Beck – Quality
- Dr. Kim – 3D printing
- Dr. Lewis – Polymers
- Dr. Olles – Advanced Mechanics
- Dr. O’Neil – Fluid Dynamics
- Dr. Phillips – Product Design
- Dr. Raisanen – Robotics & Automation
- Dr. Rice – Advanced Mechanics
- Prof. Share – Product Design
- Prof. Slifka – Robotics & Automation
- Dr. Villasmil – Fluid Dynamics

- Professor Cyr (KGCOE) – Lean Six Sigma
- Dr. Day (KGCOE) – BioMed Engineering
- Dr. Liu (KGCOE): Theoretical, computational and experimental studies of milling and hobbing
- Dr. Li (ECTET) – Robotics and AI
- Dr. Parody (COS) – Quality
- Professor Sevenler (KGCOE) – Product Lifecycle Management
**Effort**

- **Co-op or Course Project vs. Research**
  - Level of effort
  - Depth of engineering or science knowledge and use in research topic
  - No clear answer or result
  - Length of literature review
    - Tangential literature
Admissions & Exit Requirements
Admissions Requirements

- Complete a **graduate application**.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in the field of engineering, engineering technology, or computing. Students with degrees in other disciplines will be considered on an individual basis.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Applicants with a lower GPA will be evaluated on a case-by-case basis and may be admitted on a probationary basis. These students will have to secure a B or better average in the first three graduate courses to be considered for full admission.
- Submit a one-page personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
Exit Requirements

- **Thesis or Capstone** *(Comprehensive exam option)*

- **Probation & Suspension**
  - GPA >3.0 after 9 credit hours or subsequently will be placed on probation
    - Must raise their Program Cumulative GPA to the 3.0 level within 9 credit hours or risk suspension from the program.
  - B or better needed in all classes
    - Poor grades **are not replaced**: classes that are retaken have both graded included in the GPA
Timeline
Research Objectives

1. Find an Advisor
2. Plan a “Research Proposal Meeting” with a committee
   a. Committee consists of: Advisor, Grad Director and 1 other external reviewer
3. Perform Research
4. Write Capstone or Thesis Report
5. Oral Defense of Capstone or Thesis with Committee
### MMSI Timeline

Scheduling meetings for presentations to your committee can be done with the help of MMET office staff.

Maintain 3.0 GPA in graduate classes!

<table>
<thead>
<tr>
<th>Term</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting Started</td>
<td>Pick a Concentration</td>
<td>Contact Director &amp; Advisor</td>
<td>Get to know Professors</td>
</tr>
<tr>
<td>Making Progress</td>
<td>Select Advisor &amp; Committee</td>
<td>Submit plan of study</td>
<td>Present Proposal</td>
</tr>
<tr>
<td>Nearing Completion</td>
<td>Research! Write</td>
<td>Research! Write</td>
<td>Research! Write</td>
</tr>
<tr>
<td>Graduating</td>
<td>Present Final Presentation no later than week 12!</td>
<td>Receive committee feedback and make corrections</td>
<td>Clear all holds and incomplete grades and celebrate!</td>
</tr>
</tbody>
</table>

Selecting an Advisor includes registering for Capstone or Thesis courses in their section!!!
Checklist of Activity

Getting Started (During your first term)
- Contact the Director of Graduate Studies & Research concerning plan of study
- Complete course work
- Register for next term

Making Progress (During your second term)
- Submit completed Plan of Study to Research Director for approval
- Schedule regular status reviews of your work with capstone faculty advisor
- Review/revise plan of action with capstone faculty advisor
- Register for courses based on plan of study
- Select your faculty advisor
- Select advisory committee
- Develop Capstone Proposal and review with advisor (by week 10)
- Schedule presentation of proposal with MMET office
- Present Proposal to Committee (by week 12)
- Receive Committee Feedback and address as required
- Submit signed Capstone Plan Approval Form and all attachments to Research Director

Nearing Completion (one term before you graduate)
- Write capstone report and publication
- Revise and re-review (may require multiple iterations)
- Register for courses based on plan of study

Graduating (the term you plan to graduate)
- Register for final classes as required
- Clear all incomplete grades
- Clear all holds
- Submit plan to graduate to Graduate Director
- Schedule presentation of capstone project with MMET office (No later than week 12)
- Complete your capstone presentation
- Receive Committee Feedback and address as required
- Submit completed and approved copy of capstone report to Research Director (electronic and paper)
- Celebrate, and join RIT Alumni Association
INFORM YOUR ADVISOR – Delay Co-op until after research is complete or risk delaying graduation!!!

- This includes informing them when you’re interviewing!
  - You MUST have the approval of your capstone/thesis advisor prior to agreeing to the co-op assignment!!!!
- Not an option until you have completed 2 semesters of coursework
- Eligible for Co-op work, it is not required as part of the MS in MMET program.
- Must secure own Co-op assignment.
- If you decide to complete a co-op assignment
  - International students:
    > RIT’s office of International Students Services and the MMET Graduate Director must approve Co-op assignments
    > the cumulative total must not exceed 364 days in duration
  - Co-op evaluations must be completed by both the employer and student.

It is important to note that accepting a job offer, verbally or in writing, constitutes a binding contract, which may not be rescinded.
Questions?

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