

Rochester INSTITUTE OF TECHNOLOGY

Minor Program proposal form

name of college

**Name of Certifying Academic Unit: Chemical and Biomedical Engineering Department**

**Name of Minor:** Chemical Engineering Systems Analysis

**Brief description of the minor to be used in university publications**

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| The minor in Chemical Engineering Systems Analysis provides students with a sophisticated understanding of the application of scientific knowledge to the solution of a vast array of practical problems in which chemistry plays a critical role. Students are taught the systems methodology that chemical engineers employ to analyze and solve real world problems involving distinct chemical components, chemical reaction, multiple phases, and mass transfer. |

**1.0 Minor Program Approvals**

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| --- | --- | --- |
|  | Approval request date: | Approval granted date: |
| Academic Unit Curriculum Committee | March 18, 2013 | April 1, 2013 |
| College Curriculum Committee | April 1, 2013 | April 18, 2013 |
| Inter-College Curriculum Committee | May 8, 2013 | May 8, 2013 |

**2.0 Rationale:**

A minor at RIT is a related set of academic courses consisting of no fewer than 15 semester credit hours leading to a formal designation on a student's baccalaureate transcript

How is this set of academic courses related?

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| These courses provide students exposure to the fundamental courses that define the discipline of chemical engineering, and clearly distinguish chemical engineers from other engineers. Chemical engineers are experts at implementing chemical reactions (designing reactors) and separating mixtures (the result of a chemical reactions), and the three core courses in the minor provide essential background in these areas. Although reaction and separations processes are focused on making high purity materials for use in a variety of industries, the training required to do so allows chemical engineers to work in a wide variety of fields, spanning from environmental and alternative energy applications to cellular biology and nano-scale processes. Approved electives allow students to focus their training in such application areas. |

**3.0 Multidisciplinary involvement:**

If this is a multidisciplinary minor spanning two or more academic units, list the units and their role in offering and managing this minor.

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| This minor will be managed by the chemical engineering program director. Core courses reside within the chemical engineering program, but elective courses can be drawn from other disciplines. |

**4.0 Students ineligible to pursue this minor:**

Students pursuing a BS in Chemical Engineering are ineligible to pursue this minor.

**5.0 Minor Program Structure, Sequence and Course Offering Schedule:**

Describe the structure of the proposed minor and list all courses, their anticipated offering schedule, and any prerequisites.

* All minors must contain at least fifteen semester credit hours;
* Minors may be discipline-based or interdisciplinary;
* In most cases, minors shall consist of a minimum of two upper division courses (300 or above) to provide reasonable breadth and depth within the minor;
* As per New York State requirements, courses within the minor must be offered with sufficient frequency to allow students to complete the minor within the same time frame allowed for the completion of the baccalaureate degree;
* Provide a program mask showing how students will complete the minor.

Narrative of Minor Program Structure:

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| The 16 credit Chemical Engineering Systems Analysis minor consists of 3 required chemical engineering courses and two three-credit technical elective courses. Key prerequisites for this minor are a year of calculus and a year of college-level chemistry. The 3 required courses reside in the BS chemical engineering program and are:  CHME-230 Chemical Process Analysis (3 Credits)  CHME-330 Mass Transfer Operations (3 credits)  CHME-340 Reaction Engineering (4 credits)  Note that it is the 4 credit Reaction Engineering course that causes this minor to have 16 credits, instead of the more common 15 credit load. Elective courses can be taken from the list below, but others may be substituted with approval from the chemical engineering program. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Course Number & Title | SCH | Required | Optional | Fall | Spring | Annual/Biennial | Prerequisites |
| CHME-230  Chemical Process Analysis | 3 | X |  | X |  | Annual | CHMG-142, MATH-182 or equivalent (Math-182 can be taken as Co-or Pre-requisite) |
| CHME-330  Mass Transfer Operations | 3 | X |  |  | X | Annual | CHME-230, MATH-231 |
| CHME-340  Reaction Engineering | 4 | X |  | X |  | Annual | CHME-230, MATH-231 |
|  | | | | | | | |
| **APPROVED TECHNICAL ELECTIVES FOR THE MINOR** | | | | | | | |
| (Choose any 2 of the following courses) | | | | | | | |
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| ***Biomedical Technical Electives*** | | | | | | | |
| BIME-200 Introduction to Musculoskeletal Biomechanics | 3 |  | X | X |  | Annual | PHYS-211 or PHYS-211A or equivalent |
| MECE-358 Contemporary Issues in Bioengineering | 3 |  | X | X |  | Annual | Co-requisite: MECE-499 |
| BIME-370 Introduction to Biomaterials Science | 3 |  | X |  | X | Annual | CHMG-142 CHMG-145, CHME-310, BIME-200 and BIOG-240 |
| MECE-407 Biomedical Device Engineering | 3 |  | X |  | X | Annual | MECE-210, MECE-310 |
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| ***Alternate Energy Systems Technical Electives*** | | | | | | | |
| CHEM-201 Clean Energy: Hydrogen Fuel Cells | 3 |  | X |  | X | Annual | CHMG-121, CHMG-131, CHMG-141, CHEM-151, or equivalent |
| MECE-529 Renewable Energy Systems | 3 |  | X | X |  | Annual | MECE-310, MECE-352 |
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| ***Environmental Technical Electives*** | | | | | | | |
| MECE-357 Contemporary Issues in Energy and the Environment | 3 |  | X | X |  | Annual | Co-requisite: MECE-499 |
| ISEE-787 Design for the Environment | 3 |  | X | X |  | Annual | ISEE-140 and MECE-305 or Graduate Standing in ISEE department |
|  | | | | | | | |
| ***Advanced Materials Technical Electives*** | | | | | | | |
| CHMG-201 Introduction to Organic Polymer Technology | 3 |  | X | X |  | Annual | CHMG-131 and CHMG-123 |
| CHMA-222 Chemical Separations | 3 |  | X | X | X | Annual | CHMA-161 or CHMG-142 |
| CHME-350 Multiple Scale Material Science | 3 |  | X | X |  | Annual | CHME-310 and CHMO-235 and CHMI-351 |
| MECE-557 Applied Biomaterials | 3 |  | X | X | X | Annual | MECE-212, MECE-305 |
| CHME-421 Interfacial Phenomena | 3 |  | X |  | X | Annual | CHMG-141, CHME-310, MATH-231, or permission of instructor |
| CHMP-751 Colloid and Interface Science | 3 |  | X | X |  | Annual | CHMP-441 or equivalent course or graduate standing |
|  | | | | | | | |
| ***Semiconductor Processing Technical Electives*** | | | | | | | |
| MCEE-201 IC Technology | 3 |  | X | X | X | Annual |  |
| MCEE-503  Thin Films | 3 |  | X | X | X | Annual | MCEE-201 |
| MCEE-505 Lithography Materials and Processes | 3 |  | X | X | X | Annual | CHMG-131 or equivalent |

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| Total credit hours: 16 |  |

As an example, students may complete the minor by following sequences below. However, given the flexible structure of the course, multiple program sequences exist.

**Minor Course Conversion Table: Quarter Calendar and Semester Calendar Comparison**

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| **Directions: The tables on this page will be used by the registrar’s office to aid student’s transitioning from the quarter calendar to the semester calendar.**  **If this minor existed in the quarter calendar and is being converted to the semester calendar please complete the following tables.**  **If this is a new minor that did not exist under the quarter calendar do not complete the following tables.**  Use the following tables to show minor course comparison in quarter and semester calendar formats. Use courses in the (2011-12) minor mask for this table. Display all required and elective minor courses. If necessary clarify how course sequences in the quarter calendar convert to semesters by either bracketing or using some other notation. |

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| --- | --- |
| Name of Minor in Semester Calendar: | Chemical Engineering Systems Analysis |
| Name of Minor in Quarter Calendar: | Chemical Engineering Systems Analysis |
| Name of Certifying Academic Unit: |  |

| **QUARTER: Current Minor Courses** | | | **SEMESTER: Converted Minor Courses** | | |  |
| --- | --- | --- | --- | --- | --- | --- |
| Course # | Course Title | QCH | Course # | Course Title | SCH | **Comments** |
| 0309-230 | Chemical Process Analysis | 4 | CHME-230 | Chemical Process Analysis | 3 | Semester Equivalent |
| 0309-330 | Mass Transfer Operations | 4 | CHME-330 | Mass Transfer Operations | 3 | Semester Equivalent |
| 0309-340 | Reaction Engineering | 4 | CHME-340 | Reaction Engineering | 4 | Semester Equivalent |
|  | Tech. Elective 1 | 4 | xxxx-xxx | Tech Elective 1 | 3 |  |
|  | Tech. Elective 2 | 4 | xxxx-xxx | Tech Elective 2 | 3 |  |

Policy Name: **D1.1 MINORS POLICY**

 1. Definition

A minor at RIT is a related set of academic courses consisting of no fewer than 15 semester credit hours leading to a formal designation on a student's baccalaureate transcript.

The purpose of the minor is both to broaden a student's college education and deepen it in an area outside the student’s major program. A minor may be related to and complement a student’s major, or it may be in a completely different academic/professional area.   It is the responsibility of the academic unit proposing a minor and the unit’s curriculum committee to indicate any home programs for which the minor is not a broadening experience.

In most cases, minors shall consist of a minimum of two upper division courses to provide reasonable breadth and depth within the minor.

2. Institutional parameters

1. Minors may be discipline-based or interdisciplinary;
2. Only matriculated students may enroll in a minor;
3. At least nine semester credit hours of the minor must consist of courses not required by the student's home program;
4. Students may pursue multiple minors.  A minimum of nine semester credit hours must be designated towards each minor; these courses may not be counted towards other minors;
5. The residency requirement for a minor is a minimum of nine semester credit hours consisting of RIT courses (excluding "X" graded courses);
6. Posting of the minor on the student's academic transcript requires a minimum GPA of 2.0 in each of the minor courses;
7. Minors may not be added to the student's academic record after the granting of the bachelor's degree.

3. Development/approval/administration processes

* 1. Minors may be developed by faculty at the departmental, inter-departmental, college, or inter-college level. As part of the minor development process:
     1. students ineligible for the proposed minor will be identified;
     2. prerequisites, if any, will be identified;
  2. Minor proposals must be approved by the appropriate academic unit(s) curriculum committee, and college curriculum committee(s), before being sent to the Inter-College Curriculum Committee (ICC) for final consideration and approval.
  3. The academic unit offering the minor (in the case of interdisciplinary minors, the designated college/department) is responsible for the following:
     1. enrolling students in the minor (as space permits);
     2. monitoring students progress toward completion of the minor;
     3. authorizing the recording of the minor's completion on student's academic records;
     4. granting of transfer credit, credit by exam, credit by experience, course substitutions, and advanced placement;
     5. responding to student requests for removal from the minor.
  4. As per New York State requirements, courses within the minor must be offered with sufficient frequency to allow students to complete the minor within the same time frame allowed for the completion of the baccalaureate degree.

4. Procedures for Minor revision

It is the duty of the college curriculum committee(s) involved with a minor to maintain the program’s structure and coherence.  Once a minor is approved by the ICC, changes to the minor that do not have a significant effect on its focus may be completed with the approval of the involved academic unit(s) and the college curriculum committee(s).  Significant changes in the focus of the minor must be approved by the appropriate academic unit(s) curriculum committee(s), the college curriculum committee(s) and be resubmitted to the ICC for final consideration and approval.