

Rochester INSTITUTE OF TECHNOLOGY

Minor Program proposal form

name of college

**Name of Certifying Academic Unit: KGCOE**

**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 | May 5, 2017 (revision) | May 12, 2017 |
| Inter-College Curriculum Committee |  |  |

**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. 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. 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.  |

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| Course Number & Title | SCH | Required | Optional | Fall | Spring | Annual/Biennial | Prerequisites |
| CHME-230Chemical Process Analysis | 3 | X |  | X |  | Annual | CHMG-142, MATH-182 or MATH-182A or equivalent courses |
| CHME-330Mass Transfer Operations | 3 | X |  |  | X | Annual | CHME-230, CHME-310 and MATH-231 |
| CHME-340Reaction Engineering | 4 | X |  | X |  | Annual | CHME-230, CHME-310 and MATH-231 |
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| **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 |  |  |  |  |  | PHYS-211 or PHYS-211A or PHYS-206 and PHYS-207 or equivalent courses |
| MECE-358 Contemporary Issues in Bioengineering | 3 |  |  |  |  |  | Co-requisite: MECE-499  |
| BIME-370 Introduction to Biomaterials Science  | 3 |  |  |  |  |  | CHMG-141. CHMG-142 ~~CHMG-145, CHME-310,~~ BIME-200 and BIOG-240 or equivalent courses |
| MECE-407 Biomedical Device Engineering  | 3 |  |  |  |  |  | MECE-203 and MECE-310 or BIME-410 and BIME-440 or equivalent courses |
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| ***Alternate Energy Systems Technical Electives*** |
| CHEM-201 Clean Energy: Hydrogen Fuel Cells  | 3 |  |  |  |  |  | CHMG-121 or CHMG-131 or CHMG-141 or CHEM-151, or equivalent  |
| MECE-529 Renewable Energy Systems | 3 |  |  |  |  |  | MECE-310 or equivalent course ~~MECE-352~~ |
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| ***Environmental Technical Electives*** |
| MECE-357 Contemporary Issues in Energy and the Environment  | 3 |  |  |  |  |  | Co-requisite: MECE-499  |
| ISEE-787 Design for the Environment  | 3 |  |  |  |  |  | ISEE-140 or MECE-304 or MECE-305 or Graduate Standing in ISEE department |
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| ***Advanced Materials Technical Electives*** |
| CHMG-201 Introduction to Organic Polymer Technology | 3 |  |  |  |  |  | CHMG-121 or CHMG-131 or CHMG-141 or equivalent courses |
| CHMA-222 Chemical Separations  | 3 |  |  |  |  |  | CHMA-161 or CHMG-142 or equivalent courses |
| CHME-350 Multiple Scale Material Science | 3 |  |  |  |  |  | CHME-310, CHMO-231, CHMO-235, CHMI-351 and CHME-499 |
| MECE-557 Applied Biomaterials | 3 |  |  |  |  |  | ~~MECE-212,~~ MECE-305 or BIME-30 and MECE-210 or BIME-320 or equivalent courses |
| CHME-421 Interfacial Phenomena  |  |  |  |  |  |  | CHMG-141, CHME-310, MATH-231, or equivalent courses |
| CHMP-751 Colloid and Interface Science  |  |  |  |  |  |  | CHMP-441 or equivalent course or graduate standing in CHEM-MS |
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| ***Semiconductor Processing Technical Electives*** |
| MCEE-201 IC Technology | 3 |  |  |  |  |  | Students in EEEE-BS or MCEE-BS and 2nd year standing or instructor approval |
| MCEE-503Thin Films  | 3 |  |  |  |  |  | MCEE-201 or equivalent course |
| MCEE-505 Lithography Materials and Processes |  |  |  |  |  |  | CHMG-131 or equivalent course |

**Chemical Technical Electives**

CHME-310 3 CHME-230

Applied and MATH-

Thermodynamics 231 or

equivalent

 course

CHME-320 3 CHME-230

Continuum and MATH-

Mechanics I 231 and

 PHYS-211 or

 equivalent

CHME-421 3 CHMG-141 and

Interfacial Phenomena CHME-310 and

 MATH-231 or

 equivalent

CHME-431 3 CHME-330 and

Adv. Separation MATH-231 or

Processes 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 |  |