



Faculty of Science

Bachelor of Science in Applied and Industrial Mathematics

Major Program Modification – Addition of a Simple Pathway

January 2018

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This form should be used in cases where a new pathway (e.g. Bridge, Direct Entry, 2+2) has been created for an existing undergraduate program. This new pathway must not include new courses or significant changes to the original program learning outcomes. Multiple pathways into the same UOIT program may be included on this form (e.g. 3- and 5- course Bridge, equivalent pathway from multiple sending institutions).

Motion: That CPRC recommend to Academic Council the approval of the Advanced Entry pathway from Mathematics at TC Yeditepe University to the Applied and Industrial Mathematics (A.I.M.) program.

Proposal Brief

Summary of the proposed addition

- Yeditepe University is based in Istanbul Turkey and has had a partnership with UOIT for a number of years. After being approached by their Mathematics faculty, the Faculty of Science has assessed the curriculum and determined that it sufficiently matches the curriculum for the A.I.M. program to allow students a 2+2 opportunity. Students will complete 2 years at Yeditepe, with some courses from the 3rd and 4th years of their program added into years 1 and 2. With these additions, the students will have the same background as students in the 4-year A.I.M. program and will be able to transfer directly into 3rd year.
- Students will receive the following transfer credits on admission:
 - CSCI 1040U – Introduction to Programming for Scientists
 - CSCI 2000U – Practical Computing for Scientists
 - MATH 1010U – Calculus I
 - MATH 1020U – Calculus II
 - MATH 2015U – Calculus III
 - MATH 2050U – Linear Algebra
 - MATH 2055U – Advanced Linear Algebra and Applications
 - MATH 2060U – Differential Equations
 - MATH 2080U – Discrete Mathematics
 - MATH 3020U – Real Analysis
 - PHY 1010U – Physics I
 - PHY 1020U – Physics II
 - One UNSP 1XXX – Math Elective
 - One UNSP 2XXX – Math Elective
 - One UNSP 2XXX – non-science Elective (must complete an HTR or TKL course at Yeditepe University)
 - BIOL 1011U – Introductory Cellular and Molecular Biology (must complete GBE 111 – Biology I at Yeditepe University as an elective)
 - BIOL 1021U – Introduction to Organismal Biology and Ecology (must complete GBE 102 – Biology II at Yeditepe University as an elective)
 - CHEM 1010U – Chemistry I (must complete CHEM 111 – General Chemistry at Yeditepe University as an elective)
 - MATH 2072U – Computational Science I (must complete ME 372 Computer Aided Mechanical Engineering at Yeditepe University as an elective)
 - STAT 2010U – Statistics and Probability for Physical Science (must complete MATH 281 – Probability at Yeditepe University as an elective)

Description of the ways in which the proposed change will enhance the program and/or opportunities for students

This addition will provide an opportunity for international students to transfer to UOIT and complete their credential. This pathway is in line with the university's 2015-2020 International Plan. In particular: "setting international pathways as the focus of our international recruitment".

Students will have the opportunity to gain an international perspective in mathematics. Moreover, current UOIT students would benefit from having international students, who have different ideas and experiences, in their classes.

Process of consultation with other institutions and internal units if the change(s) involve students, staff, and/or faculty from other programs or courses

Faculty from biological science and chemistry were consulted to ensure the 1st year courses taken at Yeditepe match the UOIT curriculum in these core courses.

The Faculty of Science has worked with CIQE and the RO as well as the International Office to coordinate this proposal.

Admission Requirements

Students will need to complete the courses outlined for years 1 and 2 of the program at Yeditepe and be in good academic standing. Some specified courses will need to be taken as electives at Yeditepe in order to meet transfer credit requirements. Admission is competitive. The specific average or standing required for admission varies from year to year. Students must meet the general UOIT international admission requirements and successful applicants are selected by taking into consideration a wide range of criteria including school marks, distribution of subjects taken, and performance in subjects relevant to the academic program. Possession of the minimum requirements does not guarantee acceptance. Preference will be given to applicants with the best qualifications.

Brief analysis of any financial, resource, and/or enrolment implications

None, as these students will be taking the same courses as the 4-year A.I.M. students.

Proposed Implementation Date (when will students first be admitted, state term e.g. Fall 2017)

Fall 2018

Calendar Copy and/or Program Maps (highlight revisions to existing curriculum; please include the Schedules of the Articulation Agreement(s), if applicable)

Applied and Industrial Mathematics - Regular Program Map (for reference)

Black – Regular Applied and Industrial Mathematics Program Map

Green – Core course at Yeditepe University applying towards transfer credit

Blue – Elective course at Yeditepe University applying towards transfer credit

Red – modification in the Applied and Industrial Mathematics Program Map for Yeditepe University Pathway

Program map

Year 1

Semester 1 (15 credit hours)

- CHEM 1010U – Chemistry I (CHEM 111 – General Chemistry)

- CSCI 1040U – Introduction to Programming for **Scientists (CET 110 – Basic Computer Applications)**
- One of:
 - BIOL 1011U – Introductory Cell and Molecular Biology (**GBE 111 – Biology I**) or
 - BIOL 1010U – Biology I: Molecular and Cellular Systems
- One of:
 - MATH 1000U – Introductory Calculus or
 - MATH 1010U – Calculus I (**MATH 131 – Calculus I**)
- One of:
 - PHY 1010U – Physics I (**PHYS 101 – Physics I**) or
 - PHY 1030U – Introductory Physics

Semester 2 (15 credit hours)

- Elective** (UNSP 1XXXU – Math Elective = **MATH 1020 – Basic Algebraic Structures**)
- MATH 1020U – Calculus II (**MATH 132 – Calculus II**)
- MATH 2050U – Linear Algebra (**MATH 231 – Linear Algebra I**)
- PHY 1020U – Physics II (**PHYS 102 – Physics II**)
- One of:
 - BIOL 1021U – Introduction to Organismal Biology and Ecology (**GBE 102 – Biology II**) or
 - BIOL 1020U – Biology II: Diversity of Life and Principles of Ecology or
 - CHEM 1020U – Chemistry II

Year 2

Semester 1 (15 credit hours)

- Elective** (UNSP 2XXXU – Math Elective = **MATH 246 – Advanced Ordinary Differential Equations**)
- CSCI 2000U – Scientific Data Analysis (**ACM 221 – Systems Analysis and Algorithm**)
- MATH 2015U – Calculus III (**MATH 255 – Calculus III**)
- MATH 2080U – Discrete Mathematics (**MATH 154 – Discrete Mathematics**)
- STAT 2010U – Statistics and Probability for Physical Science (**MATH 281 – Probability**)

Semester 2 (15 credit hours)

- Elective** (UNPS 2XXXU – non-science Elective = **One HTR or TKL course (i.e. HTR 301 – History of Turkish Revolution, HTR 302 – History of Turkish Revolution II, TKL 201 – Turkish I, TKL 202 – Turkish II)**)
- **Elective** (moving to Year 3 – Fall semester)**
- MATH 2055U – Advanced Linear Algebra and Applications (**MATH 232 – Linear Algebra II**)
- MATH 2060U – Differential Equations (**MATH 245 – Ordinary Differential Equations**)
- MATH 2072U – Computational Science I (**ME 372 – Computer aided Mechanical Engineering**)

Year 3

Semester 1 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Elective**
- Elective**
- **Elective** (moved from Year 2)**
- MATH 3020U – Real Analysis (**MATH 256 – Introduction to Real Analysis**) (Will not be in the pathway program map)

- MATH 3050U – Mathematical Modelling

Semester 2 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Elective**
- MATH 3060U – Complex Analysis
- MATH 4020U – Computational Science II
- PHY 3040U – Mathematical Physics

Year 4

Semester 1 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Elective**
- MATH 4010U – Dynamical Systems and Chaos
- MATH 4050U – Partial Differential Equations
- One of:
 - MATH 4410U – Mathematics Thesis Project I *** or
 - Senior Science elective **

Semester 2 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Two electives**
- MATH 4060U – Industrial Mathematics
- One of:
 - MATH 4420U – Mathematics Thesis Project II *** or
 - Senior Science elective **

Notes:

No more than 42 credit hours may be taken at the first-year level.

**Electives and breadth requirements

All students must complete 42 elective credit hours including the 12 credit hours in Applied and Industrial Mathematics electives. Students not accepted to take MATH 4410U and MATH 4420U must take an additional two senior science electives for a total of 48 elective credit hours. A senior science elective is defined as any 3000- or 4000-level science course not specified in the program map, excluding SCIE and ENV5 courses. At least 24 elective credit hours must be in courses offered by the Faculty of Science including the 12 credit hours in Applied and Industrial Mathematics Electives. The additional two senior science electives required for students who are not enrolled in thesis cannot be used to meet this requirement. In order to satisfy breadth requirements, no more than 21 elective credit hours total may be in mathematics (MATH); at least 12 elective credit hours must be in courses outside the Faculty of Science. Students must take the remaining 6 elective credit hours in a general elective (offered by the Faculty of Science or outside the Faculty of Science).

Applied and Industrial Mathematics electives:

- MATH 3030U – Introduction to Probability Theory
- MATH 3040U – Optimization

- MATH 3070U – Algebraic Structures
- MATH 4030U – Applied Functional Analysis
- MATH 4041U – Topics in Applied Mathematics I
- MATH 4042U – Topics in Applied Mathematics II

***Thesis Project or Senior Science electives

Students in clear academic standing who have completed 90 credit hours of their MATH program and five third-year required courses may optionally apply to take a two-course sequence consisting of MATH 4410U – Mathematics Thesis Project I and MATH 4420U – Mathematics Thesis Project II. Students not accepted to take the thesis courses must complete two additional senior science electives instead. A senior science elective is defined as any 3000- or 4000-level science course not specified in the program map, excluding SCIE and ENVS courses. A student meeting the above requirements who does not take MATH 4410U and MATH 4420U may optionally apply to take MATH 4430U – Directed Studies in Mathematics as one of the required Senior Science electives. Opportunities for the Thesis Project and Directed Studies options are limited; for either of these options, students must apply through Science Advising by March 30 following completion of the first three years of the program.

Recommended Senior Science electives that students in the Applied and Industrial Mathematics program may choose to take include:

- CSCI 3010U – Simulation and Modelling
- CSCI 3070U – Analysis and Design of Algorithms
- CSCI 3090U – Computer Graphics and Visualization
- PHY 3020U – Quantum Mechanics I
- PHY 3050U – Waves and Optics
- PHY 3060U – Fluid Dynamics
- STAT 3010U – Biostatistics

Calendar Copy – Applied and Industrial Mathematics Pathway:

Year 3

Semester 1 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Three Electives**
- MATH 3050U – Mathematical Modelling

Semester 2 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Elective**
- MATH 3060U – Complex Analysis
- MATH 4020U – Computational Science II
- PHY 3040U – Mathematical Physics

Year 4

Semester 1 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Elective**
- MATH 4010U – Dynamical Systems and Chaos

- MATH 4050U – Partial Differential Equations
- One of:
 - MATH 4410U – Mathematics Thesis Project I *** or
 - Senior Science elective **

Semester 2 (15 credit hours)

- Applied and Industrial Mathematics elective**
- Two electives**
- MATH 4060U – Industrial Mathematics
- One of:
 - MATH 4420U – Mathematics Thesis Project II *** or
 - Senior Science elective **

Notes:

No more than **15** credit hours may be taken at the first-year level.

**Electives and breadth requirements

All students must complete **33** elective credit hours including the 12 credit hours in Applied and Industrial Mathematics electives. Students not accepted to take MATH 4410U and MATH 4420U must take an additional two senior science electives for a total of **39** elective credit hours. A senior science elective is defined as any 3000- or 4000-level science course not specified in the program map, excluding SCIE and ENVS courses. At least **18** elective credit hours must be in courses offered by the Faculty of Science including the 12 credit hours in Applied and Industrial Mathematics Electives. The additional two senior science electives required for students who are not enrolled in thesis cannot be used to meet this requirement. In order to satisfy breadth requirements, no more than **15** elective credit hours total may be in mathematics (MATH); at least **9** elective credit hours must be in courses outside the Faculty of Science. Students must take the remaining 6 elective credit hours in a general elective (offered by the Faculty of Science or outside the Faculty of Science).

Applied and Industrial Mathematics electives:

- MATH 3030U – Introduction to Probability Theory
- MATH 3040U – Optimization
- MATH 3070U – Algebraic Structures
- MATH 4030U – Applied Functional Analysis
- MATH 4041U – Topics in Applied Mathematics I
- MATH 4042U – Topics in Applied Mathematics II

***Thesis Project or Senior Science electives

Students in clear academic standing who have completed 90 credit hours of their MATH program and five third-year required courses may optionally apply to take a two-course sequence consisting of MATH 4410U – Mathematics Thesis Project I and MATH 4420U – Mathematics Thesis Project II. Students not accepted to take the thesis courses must complete two additional senior science electives instead. A senior science elective is defined as any 3000- or 4000-level science course not specified in the program map, excluding SCIE and ENVS courses. A student meeting the above requirements who does not take MATH 4410U and MATH 4420U may optionally apply to take MATH 4430U – Directed Studies in Mathematics as one of the required Senior Science electives. Opportunities for the Thesis Project and

Directed Studies options are limited; for either of these options, students must apply through Science Advising by March 30 following completion of the first three years of the program.

Recommended Senior Science electives that students in the Applied and Industrial Mathematics program may choose to take include:

- CSCI 3010U – Simulation and Modelling
- CSCI 3070U – Analysis and Design of Algorithms
- CSCI 3090U – Computer Graphics and Visualization
- PHY 3020U – Quantum Mechanics I
- PHY 3050U – Waves and Optics
- PHY 3060U – Fluid Dynamics
- STAT 3010U – Biostatistics

APPROVAL DATES

Curriculum Committee Approval	5 Jan 2018
Faculty Council Approval	10 Jan 2018
CPRC or GSC Approval	19 January 2018
Academic Council Approval	