Florida Institute of Technology

ADDITION TO THE CURRICULUM

This course is available for student registration only after the approval process has been completed.

SUBJECT (e.g., CSE)
COURSE NO.* (e.g., 1301)
CREDIT HOURS 3
TERM TO BE ADDED TO THE FILE (e.g., Fall 2010)

CLASS HOURS 45/semester
LECTURE HOURS 30/semester
LAB HOURS 15/semester
CONTACT HOURS (CEU ONLY)

DEPARTMENT Mathematical Sciences
SCHEDULE TYPE Lecture/Lab (C)
(e.g., Computer Sciences)
(e.g., Lecture, Lab or Special Topics/Project)

□ COLLEGE OF AERONAUTICS – 26
□ COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS – 25
□ NATHAN M. BISK COLLEGE OF BUSINESS – 24
□ COLLEGE OF SCIENCE – 25
□ COLLEGE OF ENGINEERING – 1
□ EXTENDED STUDIES DIVISION / NATHAN M. BISK COLLEGE OF BUSINESS – 90

COMPUTER TITLE Restricted to 25 characters, including spaces Functions & Modeling

FUNCTIONS & MODELING
Dual-Prefix, Bi-Level, Full-Load?
□ Yes  □ No

CATALOG TITLE Functions and Modeling

CATALOG DESCRIPTION OF COURSE Restricted to 350 characters, including spaces
Provides prospective secondary education teachers discussions of case studies from different applications. Emphasizes the formulation of models and their analysis using mathematical tools from calculus, differential equations, linear algebra and probability statistics. (Requirements: Junior standing and instructor approval.)

This description has been approved by the catalog office

Catalog Director
Date

In addition, please attach a course syllabus and/or more detailed description.

REQUIREMENTS
□ Prerequisite MTH 2201
□ Corequisite MTH 3102
□ and/or □ and/or
□ and/or □ and/or

GRADES TO BE ISSUED
□ A, B, C, D, F
□ A, B, C, D, F, CEU/Audit
□ CEU
□ S, U
□ R, F
□ Other

ADDITIONAL RESTRICTION Requires junior standing and instructor approval.

If this course replaces a course currently offered in BANNER, please indicate old course information and the date/term the course may be removed from the system.

SUBJECT Alpha Prefix (e.g., CSE) COURSE NO. (e.g., 1301) TERM TO INACTIVATE

APPROVALS: Upon completion of appropriate department approvals, submit form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee for approval below and forward to Catalog Director.

Originator Date

Chair, Graduate Council Date

Dean or Associate Dean Date

Chair, Undergraduate Curriculum Committee Date

CATALOG DIRECTOR

These changes/additions have been made for the University Catalog and entered into the BANNER term named above.

Catalog Director Date

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SCARRES Operator Init. Date

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Florida Institute of Technology

ADDING A NEW COURSE TO THE CURRICULUM

This course is available for student registration only after the approval process has been completed.

SUBJECT MATH
(e.g., CSE)
COURSE NO.* 3010
Credit Hours 3
TERM TO BE ADDED TO THE FILE Spring 2013
(e.g., Fall 2010)

*Justify level if 1000-level and no co- or prerequisites...

CLASS HOURS 3
LECTURE HOURS 2
LAB HOURS 1
CONTACT HOURS (CEU ONLY) __________

DEPARTMENT Mathematical Sciences
(e.g., Computer Sciences)
SCHEDULE TYPE Lecture
(e.g., Lecture, Lab or Special Topics/Project)

☐ COLLEGE OF AERONAUTICS - 23
☐ COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS - 25
☐ NATHAN M. BISK COLLEGE OF BUSINESS - 24
☒ COLLEGE OF SCIENCE - 26
☐ COLLEGE OF ENGINEERING - 1
☐ EXTENDED STUDIES DIVISION / NATHAN M. BISK COLLEGE OF BUSINESS - 90

COMPUTER TITLE Restricted to 25 characters, including spaces Functions and Modeling
Dual-Prefix, Bi-Level, Full-Load? ☐ Yes ☐ No

CATALOG TITLE Functions and Modeling

CATALOG DESCRIPTION OF COURSE
Restricted to 350 characters, including spaces

Intended for prospective secondary education teachers in FIT4U Teach mathematics track. Case studies from different application areas are discussed, with emphasis on the formulation of models and their analysis using mathematical tools from Calculus, Differential Equations, Linear Algebra, Probability Statistics.

This description has been approved by the catalog office

Catalog Director Date

In addition, please attach a course syllabus and/or more detailed description.

RESTRICTIONS ☑ Prerequisite MTH2201 ☑ Corequisite MTH3102
Course Number
☐ Prerequisite Course Number
☐ Corequisite Course Number

☐ Prerequisite Course Number
☐ Corequisite Course Number

☐ and or ☐ and or

GRADES TO BE ISSUED
☒ A, B, C, D, F
☐ A, B, C, D, F, CEU/Audit
☒ CEU
 ☐ S, U
 ☐ P, F
☐ Other

ADDITIONAL RESTRICTION
Junior Level, Instructor approval

(e.g., Major, Class Level, Department Head Approval)

If this course replaces a course currently offered in BANNER, please indicate old course information and the date/term the course may be removed from the system.

SUBJECT Alpha Prefix (e.g., CSE) __________________________ COURSE NO. (e.g., 1301) ________________ TERM TO INACTIVATE ________

APPROVALS: Upon completion of appropriate department approvals, submit form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee for approval below and forward to Catalog Director.

Originate 9/21/12

Chair, Graduate Council Date

Department Head/Program Chair 9/21/2012 OR

Date

Dean or Associate Dean 9/27/2012

Date

Chair, Undergraduate Curriculum Committee Date

CATALOG DIRECTOR

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Catalog Director Date

REGISTRAR’S USE ONLY

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SCCHRIES ______ Operator Init. ______ Date ______

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ROR-122-1011
MTH 3102 Functions and Modeling

Instructor: Bhaskar Tenali (Mathematical Sciences)

Text: No text book; See the list of books given below for references.

Course Objectives: To demonstrate a depth of content knowledge with regard to important secondary mathematics topics; To generate or work with relevant lab or exploration data and use appropriate mathematical concepts; To identify mathematical content connection between various levels of secondary mathematics curriculum and between secondary and university curriculum; To Study and analyze the process of mathematical modeling for problems arising from different applications areas; To Use reflective and collaborative learning, explore and learn.; To Use of technology in solving problems.

Prerequisites: The prerequisite for this course is Differential Equations (MTH2201) and a co-requisite is Linear Algebra (MTH3102).

Syllabus: Several case studies from different application areas are discussed, with emphasis on the formulation of the model, study of the different functions that arise in the process and analysis of the model using mathematical tools from Calculus, Differential equations, Linear Algebra, Probability and statistics. Sample case studies include equations of motion, annuity problem, dimensional analysis, predator-prey systems, functional equations and traffic dynamics. Students will be required to collaborate and present the results.

Grading:

Home Work Assignments: 25%

Labs: 20%

Mid Term Project: 15%

Semester End Project: 20%

Final: 20%

References:

This course is available for student registration only after the approval process has been completed.

**Subject**

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*Justify level if 1000-level+ and no co- or prerequisites.

**Class Hours**

- 45/semester

**Lecture Hours**

- 45/semester

**Lab Hours**

**Contact Hours (CEU Only)**

**Department**

- Mathematical Sciences

**Schedule Type**

- Lecture (A)

**Catalog Title**

Intro to Number Theory

**Catalog Description**

Restricted to 25 characters, including spaces. Covers divisibility, prime numbers, unique factorization, congruences, quadratic reciprocity, Diophantine equations, properties of rational numbers, polynomials and dynamical systems. Includes computation, formulating conjectures, writing proofs and extended projects.

This description has been approved by the catalog office.

**In addition, please attach a course syllabus and/or more detailed description.**

**Restrictions**

- Prerequisite MTH 1002
- Corequisite

**Grades to Be Issued**

- A, B, C, D, F
- CEU
- S, U
- P, F
- Other

**Additional Restrictions**

If this course replaces a course currently offered in BANNER, please indicate old course information and the date/term the course may be removed from the system.

**Subject**

- Alpha Prefix (e.g., CSE)
- Course No. (e.g., 1301)
- Term to Inactivate

**Approvals**

Upon completion of appropriate department approvals, submit form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee for approval below and forward to Catalog Director.

**Originator**

Date

**Department Head/Program Chair**

Date

**Dean or Associate Dean**

Date

**Catalog Director**

Date

**Registrar's Use Only**

SCACRE SCADTL SCAPREQ SCABASE

SCARRIES Operator Init. Date
Florida Institute of Technology

ADDING A NEW COURSE TO THE CURRICULUM

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*Justify level if 1000-level+ and no corequisites

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DEPARTMENT: Mathematical Sciences

SCHEDULE TYPE: Lecture

- COLLEGE OF AERONAUTICS - 23
- COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS - 25
- COLLEGE OF SCIENCE - 26
- EXTENDED STUDIES DIVISION / NATHAN M. BISK COLLEGE OF BUSINESS - 90

COMPUTER TITLE: Restricted to 25 characters, including spaces
Intro. to Number Theory

Dual- Prefix, Bi-Level, Full-Load?  Yes  No

CATALOG TITLE: Restricted to 350 characters, including spaces
Introduction to Number Theory

CATALOG DESCRIPTION OF COURSE: Restricted to 350 characters, including spaces
Divisibility, prime numbers, unique factorization, congruences, quadratic reciprocity, Diophantine equations, properties of rational numbers, polynomials, dynamical systems. This course involves computation, formulating conjectures, writing proofs, and extended projects. Prerequisites: MTH 1002.

In addition, please attach a course syllabus and/or more detailed description.

RESTRICTIONS: Restricted to 350 characters, including spaces
Prerequisite: MTH 1002

In addition, please attach a course syllabus and/or more detailed description.

Grades to be issued:
- A, B, C, D, F
- A, B, C, D, F, CEU/Audit

If this course replaces a course currently offered in BANNER, please indicate old course information and the date/term the course may be removed from the system.

SUBJECT: Alpha Prefix (e.g., MTH)

COURSE NO. (e.g., 1301)

TERM TO INACTIVATE

APPROVALS: Upon completion of appropriate department approvals, submit form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee for approval below and forward to Catalog Director.

Originator: [Signature]
Date: 9/21/2012

Chair, Graduate Council
Date: 9/21/2012

OR

Chair, Undergraduate Curriculum Committee
Date: 9/27/2012

Catalog Director

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Catalog Director
Date

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ROR-122-101
Math 3401 Introduction to Number Theory

Instructors: Benjamin Hutz - Mathematical Sciences

Textbook: Introduction to Number Theory Through Experimentation, by Benjamin Hutz.

Prerequisites:
  • MTH 1002 - Calculus 2

Students must have a basic understanding of functions and equations such as required in MTH 1002.

Catalog Description: Divisibility, prime numbers, unique factorization, congruences, systems of linear congruences, quadratic reciprocity, Diophantine equations, properties of rational numbers, polynomials, dynamical systems. The course involves computation, formulating conjectures, problem solving, writing proofs, and extended projects. Prerequisites MTH 1002.

Course Objectives: In this course the students will learn the fundamentals of number theory through discovery and experimentation. This includes basic properties of arithmetic and modular arithmetic, properties of rational numbers, solutions to Diophantine equations, and arithmetic properties of dynamical systems.

A major focus will be teaching the students to think mathematically. In particular, to teach students to develop their own mathematical problems and to conjecture possible solutions. A heavy emphasis will be placed on computation. Student will also learn to write mathematical proofs.

The course will be supported by the computer algebra system Sage.

Course Content:

(1) Integers and Rational numbers
   (a) primes and divisibility
   (b) least common multiple, greatest common divisor, and the Euclidean algorithm
   (c) unique factorization
   (d) arithmetic functions such as Euler’s Totient function
   (e) height functions
   (f) continued fractions
   (g) algebraic numbers

(2) Modular Arithmetic
   (a) Basics of modular arithmetic
   (b) Solving linear congruences, including the Chinese Remainder theorem.
   (c) Quadratic congruences and the law of Quadratic Reciprocity.

(3) Diophantine Equations
   (a) Pythagorean triples
   (b) the Hasse principle and Diophantine equations modulo primes.
   (c) Solving particular Diophantine equations, such as Pell’s equation, Congruent Number problem, and the Waring Problem.

(4) Polynomials
   (a) Factorization of polynomials
   (b) Diophantine equations involving polynomials

(5) Dynamical Systems
   (a) iteration of functions
   (b) rational preperiodic cycles
   (c) Dynamical systems modulo primes.
**Grading:** The assessments in this course will be weekly homework assignments, 1 group project, 3 in-class exams, and a final. Specifically, your grade is determined by

- 10% classroom presentations on extended investigations
- 10% two extended written projects
- 20% weekly homework
- 40% 2 in-class exams
- 20% Final Exam