New Course Proposal

Date Submitted: 11/04/14 4:01 pm

Viewing: INSY 3010: Programming and Database Applications for ISE

Last edit: 11/04/14 4:01 pm

Changes proposed by: SIMSLUA

Programs referencing this course

INSY-bise: BISE Industrial and Systems Engineering

Approval Path

1. 11/13/14 3:48 pm
   SIMSLUA: Approved for INSY Editor

2. 11/13/14 4:25 pm
   VALENJO: Approved for INSY Chair

3. 12/19/14 7:40 am
   DUKESTE: Approved for EN Undergraduate Curriculum Committee Chair

4. 12/19/14 7:48 am
   DUKESTE: Approved for EN Editor

5. 12/19/14 7:50 am
   DUKESTE: Approved for EN Associate Dean

In Workflow

1. INSY Editor
2. INSY Chair
3. EN Undergraduate Curriculum Committee Chair
4. EN Editor
5. EN Associate Dean
6. Coordinator Curriculum Management
7. University Curriculum Committee Chair
8. Coordinator Curriculum Management

Submitter: SIMSLUA

User ID: SIMSLUA
Phone: 334-844-1430

Proposing College/School: College of Engineering

Department: Industrial & Systems Engr.

Effective Term: Fall 2015
This course will replace a computer science course in our curriculum COMP 3010. Our students are not being adequately trained in how to program for industrial engineering applications. This has been evident to the instructors of other ISE courses required in the major where students have been unable to complete assigned programming assignments even though they have taken the required pre-requisite computer class COMP 3010. The Computer Science department agrees that it is best if this course is taught in the ISE department because of the unique needs of industrial engineers to use specific types of programming in other courses in our major.

Course Title: Programming and Database Applications for ISE
Abbreviated Title: ISE Prog. and Database Apps

<table>
<thead>
<tr>
<th>Schedule Type</th>
<th>Contact/Group Hours</th>
<th>Weekly or Per Term?</th>
<th>Credit Hours</th>
<th>Anticipated Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>3</td>
<td>Weekly</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

Can the course be repeated? No
Total Credit Hours: 3

Grading Type: Standard Grades
Prerequisites: COMP 1200 - Introduction to Computing for Engineers and Scientists
Corequisites:
Restrictions: Include Junior, Include Sophomore, Include Senior
Other Restrictions: Must be Industrial and Systems Engineering major or pre-major
Admin Restrictions:
Course Description: Programming and database applications for ISE students. Focus is on algorithm development as related to optimization, probability, statistics, and data analysis.
May Count Either:
## Affected Program(s):

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Program Title</th>
<th>Requirement or Elective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Bachelor of Industrial and Systems Engineering</td>
<td>Requirement</td>
</tr>
</tbody>
</table>

## Overlapping or Duplication of Other Units' Offerings:
No

## Resources
No additional resources are required for the institution. However, the teaching load will move from the Computer Science and Software Engineering department to the Industrial and Systems Engineering department. The ISE department already has instructors who are qualified to teach this course.

## Course Objectives/Outcomes
1. Students will be able to design and implement algorithms using Matlab and Python.

2. Students will be able to design and implement databases using Microsoft Access and MySQL and access these databases programmatically using Python.

## Is this course considered University Core?
No

### Course Content Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Material</th>
<th>Assignment/Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, tools, system configuration, compilers vs interpreters</td>
<td>Video Module 1</td>
</tr>
<tr>
<td>2</td>
<td>Code structure, Variables and Scope, Flow Control</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Subroutines and functions, histograms/probability distributions, descriptive statistics, confidence interval computation, Pseudo code</td>
<td>HW1 Due (Mon)</td>
</tr>
<tr>
<td>4</td>
<td>Algorithm design and implementation – Pseudo code and data structures (lists, dictionaries, complex structures)</td>
<td>Video Module 2</td>
</tr>
</tbody>
</table>
5 Algorithm design and implementation – Optimization problems with the Gurobi Solver.

6 Database design and implementation – introduction, servers, clients, desktop applications

7 Database design and implementation – Using Access and MySQL

8 Database design and implementation – Relational database model

9 Relational database model – statistical sampling procedures

10 Relational database model – Describing optimization models using a relational database

11 Query design and implementation – Generating Gurobi optimization models from a database

12 Integration – Using Python with MySQL and Access – ODBC, DB API

13 Integration – Collection and analysis of data

14 Integration – Development and solution of optimization problems

15 Integration - Monte Carlo Simulation

Final Exam
Homework Assignments

1. Students will implement programs using Python and Matlab that demonstrate the use of variables and basic flow control. In addition, the assignment will ensure that the students understand the basic use of Python and Matlab in programmatic and interactive environments.

2. Algorithm design and implementation. Students will develop pseudo code and implement programs that use subroutines and functions to compute probability distributions and display the results. Will also include data structure design and implementation.

3. Database design and implementation. Students will design and implement a database using Access and MySQL.

4. Relational database model. Students will design and implement a database with several related tables (using one-to-one and one-to-many relationships).

Course Project

Will involve integration of database design/implementation and programming with Python. Will be done in teams of 2 students.

Video Modules

These modules will be viewed by students before attending the classe(s) where the material is discussed.

1. Development environment, files, directories, executing program
2. Data structures
3. Database implementation with Access and MySQL
4. Query design and implementation

Course will be graded based on homework, exams, and a course project.

Homework: 20%
Exams (3): 20% each
Course Project: 20%

Rubric and Grading Scale

Attachments
Course reviewer comments