**Course Syllabus**

**Time and Place**

Summer Session II, 2008  
M, T, W, TH; 9-12 and 1-4pm  
See the following page for the meeting places

**Instructors**

Dr. Mesut Duran ([mduran@umich.edu](mailto:mduran@umich.edu)) will oversee the course activities  
Dr. Paul Zitzewitz ([pwz@umich.edu](mailto:pwz@umich.edu)) will teach IT/Science section  
Dr. Brahim Medjahed ([brahim@umd.umich.edu](mailto:brahim@umd.umich.edu)) will teach IT/Technology section  
Dr. Elsayed Orady ([orady@umich.edu](mailto:orady@umich.edu)) will teach IT/Engineering section  
Dr. Margret Höft ([mhoft@umd.umich.edu](mailto:mhoft@umd.umich.edu)) will teach IT/Mathematics section  
Course Management Site: [http://vlt.engin.umd.umich.edu](http://vlt.engin.umd.umich.edu)

Enrolment Key: FIT

**Course Overview**

PDED 518 is a one-semester three credit-hour graduate level IT/STEM course. This course focuses on information technology (IT) applications in the context of Science, Technology, Engineering, and Mathematics (STEM).

The *science* component will concentrate on three different but related applications of IT in the sciences; measurement, modeling, and mapping.

The *technology* component will focus on technological tools and languages for designing and developing Web applications such as Web-based games and chat-rooms.

The *engineering* component will emphasize the basics of robotics and its applications as related to IT, including modeling robots, programming robots, and integrating robots into an application environment such as a manufacturing system or a medical application.

The *mathematics* component will focus on statistical science with consideration of the two-sample comparison problem, the simple regression/correlation problem, and the simple analysis of covariance problem taking examples and assignments from public health science, environmental science, and manufacturing reliability.

The course *objectives* are as follows:

- Use GPS and GIS for mapping and mathematical descriptions of locations
- Use temperature and light sensors in the sciences.
- Create mathematical models using STELLA that incorporate measured quantities and make predictions.
- Familiarize students with integrated development environments such as Visual Studio
Familiarize Students with game development using DirectX and Visual Basic

Use robotics programming languages

Learn the basic of robotics

Learn integration of robots in an application environment such as manufacturing system or surgery operating room

Understand the basic two-sample comparison problem in statistics, the basic regression problem in statistics, and the basic analysis of the covariance problem in statistics.

Use Minitab to create comparative displays and regression displays and will perform appropriate analysis to test for and estimate effect sizes.

Write reports based on their findings using data analysis.

### Schedule (Tentative)

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Subject</th>
<th>Instructor</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 7</td>
<td>9am-12pm</td>
<td>Science</td>
<td>Zitzewitz</td>
<td>PEC across campus to 62 SB</td>
</tr>
<tr>
<td></td>
<td>1-4pm</td>
<td>Technology</td>
<td>Medjahed</td>
<td>PEC 1430/40</td>
</tr>
<tr>
<td>July 8</td>
<td>9am-12pm</td>
<td>Engineering</td>
<td>Orady</td>
<td>PEC 1430/40</td>
</tr>
<tr>
<td></td>
<td>1-4pm</td>
<td>Mathematics</td>
<td>Gillespie</td>
<td>2046 CB</td>
</tr>
<tr>
<td>July 9</td>
<td>9am-12pm</td>
<td>Science</td>
<td>Zitzewitz</td>
<td>62 SB or 29 or 62 SB</td>
</tr>
<tr>
<td></td>
<td>1-4pm</td>
<td>Technology</td>
<td>Medjahed</td>
<td>PEC 1430/40</td>
</tr>
<tr>
<td>July 10</td>
<td>9am-12pm</td>
<td>Engineering</td>
<td>Orady</td>
<td>PEC 1430/40</td>
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<tr>
<td></td>
<td>1-4pm</td>
<td>Mathematics</td>
<td>Gillespie</td>
<td>2046 CB</td>
</tr>
<tr>
<td>July 14</td>
<td>9am-12pm</td>
<td>Science</td>
<td>Zitzewitz</td>
<td>29 SB or 2238 SBCW</td>
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<td></td>
<td>1-4pm</td>
<td>Technology</td>
<td>Medjahed</td>
<td>PEC 1430/40</td>
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<td>July 15</td>
<td>9am-12pm</td>
<td>Engineering</td>
<td>Orady</td>
<td>PEC 1430/40</td>
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<td></td>
<td>1-4pm</td>
<td>Mathematics</td>
<td>Gillespie</td>
<td>2046 CB</td>
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<tr>
<td>July 16</td>
<td>9am-12pm</td>
<td>Science</td>
<td>Zitzewitz</td>
<td>2238 SBCW</td>
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<td></td>
<td>1-4pm</td>
<td>Technology</td>
<td>Medjahed</td>
<td>PEC 1430/40</td>
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<tr>
<td>July 17</td>
<td>9am-12pm</td>
<td>Engineering</td>
<td>Orady</td>
<td>PEC 1430/40</td>
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<td></td>
<td>1-4pm</td>
<td>Mathematics</td>
<td>Gillespie</td>
<td>2046 CB</td>
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</tbody>
</table>

### Learning Activities

**Science**

- Experience making location measurements using GPS and integrating the measurements in a GIS system
- Build, calibrate, and use temperature and light sensors
- Explore mathematical modeling of environmental variables

**Technology**

- Teach students the basics of visual programming
- Familiarize students with integrated development environments such as Visual Studio
- Familiarize Students with game development in Visual Basic

### Deleted:

- Use Visual Studio for game design and development
- Simulation software packages such as IGRIP
- Such as modeling and programming robots
- Teach students the design and development of game applications

2
Engineering
- Teach students basic fundamentals of robotics technology
- Train students on robotics software and design of robotics environment
- Familiarize students with robotics applications

Mathematics
- Presentation of the two-sample problem with examples. Minitab exercise in class to create comparative displays using comparison dotplots, histograms, and boxplots. The performance and interpretation of the Minitab two-sample t-test and the estimation of the effect size will be pursued. Write up conclusions.
- Presentation of the simple linear regression problem in the context of experimental data and observational data. Minitab exercise in class to create scatterplots with regression lines included. The performance and interpretation of the Minitab test for a regression effect and the estimation of the regression effect will be pursued. Write-up of conclusions.
- Presentation of analysis of covariance in the context of comparing two simple linear regression lines with examples.

Evaluation

Science (100 points)
- Homework assignments (90 points)
- Completion of calibrated sensors (10 points)

Technology (100 points)
- One homework assignment for the Technology discipline (?? points)
- One final exam for the Technology discipline (?? points)
- Quiz?? ( ?? points)

Engineering (100 points)
- Assignment 1: Mathematical molding of robots (15 pts.)
- Assignment 2: Modeling of robotics environment (15 pts.)
- Assignment 3: Lab work for programming and operation of robots (70 pts.)

Mathematics (100 points)
- At home Assignment 1 (?? points): A data set will be provided together with the context for the experiment for which a report containing an Introduction, Results, and Conclusion sections will be written. This report format will be discussed and an example provided.
- At home Assignment 2 (?? points): A data set will be provided together with the context for the experiment for which a report containing Introduction, Results, and Conclusion sections will be written.

The final grade will be derived from the course work done during the course, worth total of (e.g., 400) points. Grades will be assigned based on the percentage of total points earned.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage of Total Points</th>
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<tbody>
<tr>
<td>A+</td>
<td>98 - 100% of tp</td>
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<tr>
<td>A</td>
<td>95 - 97% of tp</td>
</tr>
<tr>
<td>A-</td>
<td>91% - 94% of tp</td>
</tr>
<tr>
<td>B+</td>
<td>87% - 90% of tp</td>
</tr>
<tr>
<td>B</td>
<td>84 - 86% of tp</td>
</tr>
<tr>
<td>B-</td>
<td>80% - 83% of tp</td>
</tr>
<tr>
<td>C+</td>
<td>76% - 79% of tp</td>
</tr>
<tr>
<td>C</td>
<td>73% - 75% of tp</td>
</tr>
<tr>
<td>C-</td>
<td>70% - 72% of tp</td>
</tr>
<tr>
<td>D/E</td>
<td>less than 70% of tp</td>
</tr>
</tbody>
</table>
Policies

Attendance Policy:
It is expected that students will attend each scheduled class. If you cannot make a class session, you need to call or email the instructor. If it is necessary for student to miss a class, the student should arrange to obtain class notes from other students or from the course Web site. Excessive absenteeism (3 or more classes) will result in the final grade being lowered one full grade. Reasonable accommodations will be made for holidays including religious observances if they fall during a test or due assignment. Students must notify the instructor in advance in such cases.

Submission of Assignments:
It is expected that each student will turn in each learning activity on time. Late submission is subject to 20% of the total point of each particular assignment.

Academic Integrity:
The University of Michigan-Dearborn values academic honesty and integrity. Each student has a responsibility to understand, accept, and comply with the University’s standards of academic conduct as set forth in the Code of Academic Conduct, as well as policies established by the schools and colleges. Any or all work submitted in this course may be submitted to a plagiarism detection service-TURNITIN. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offenses. Violations will not be tolerated and may result in penalties up to and including expulsion from the University. School of Education removes students from the School if they are found guilty twice of academic dishonesty in any UM-D class.

Disability Resource Service (DRS):
The University will make reasonable accommodations for persons with documented disabilities. Students need to register with Disability Resource Services (DRS) every semester they are enrolled for classes. DRS is located in Counseling & Support Services, 2157 UC. To be assured of having services when they are needed, students should register no later than the end of the add/drop deadline of each term.

Reading Materials & Supplies

Science
- Class handouts

Technology

Engineering
- Class handout and laboratory experiments.

Mathematics
- Minitab and Excel software
- Class handouts and a course pack will be prepared
Science
- STELLA
- Other web sites will be identified in the class

Technology
- Visual Basic Express Edition (free download)

Engineering
- Several websites including You Tube presentations

Mathematics
- National Institute of Standards and Technology, Statistical Reference Data Sets NIST StDS: http://www.itl.nist.gov/div898/strd/ Data sets that are both authentic and created to illustrate particular statistical issues and methodology are included in a number of categories including simple comparison, simple, polynomial and multiple regression, and more.
- DASL: Data and Story Library. See http://lib.stat.cmu.edu/DASL/. Contains a terrific library of data sets along with the stories behind them. Data sets are from many areas including biostatistical/biomedical and environmental. The smoking and lung cancer data set is a terrific simple linear regression example.
- Statistics e-Book created by UCLA online at: http://wiki.stat.ucla.edu/socr/index.php/EBook. They call this a basic statistics book for high school AP statistics that is available online to anyone. It is a terrific and sophisticated textbook containing a years worth of beginning college level statistics.
- Statistics Resources compiled by Stephen Soldz at http://www.soldzresearch.com/statisticsresources.htm contains many links to sites with data sets, online textbooks, and much more.