

Marshall University Syllabus

Course / Title Number	MTH 480/490: Research in Industrial Mathematics												
Semester/Year	Spring 2016												
Days/Time	MWF 10:00AM - 10:50AM												
Location	Smith 514												
Instructor	Dr. Michael Schroeder												
Office	Smith 742F												
Phone	(304)696-6643												
E-Mail	schroederm@marshall.edu												
Office/Hours	T 1:30PM-4:00PM, R 12:30PM - 3:00PM												
University Policies	<p>By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to</p> <p style="text-align: center;">www.marshall.edu/academic-affairs</p> <p>and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to</p> <p style="text-align: center;">http://www.marshall.edu/academic-affairs/?page_id=802</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Academic Rights and Responsibilities of Students</td><td style="width: 50%;">Academic Dishonesty</td></tr> <tr> <td>Excused Absence Policy for Undergraduates</td><td>Affirmative Action</td></tr> <tr> <td>Academic Probation and Suspension</td><td>Inclement Weather</td></tr> <tr> <td>Computing Services Acceptable Use</td><td>Sexual Harassment</td></tr> <tr> <td>Students with Disabilities</td><td>Dead Week</td></tr> <tr> <td>Academic Forgiveness</td><td></td></tr> </table>	Academic Rights and Responsibilities of Students	Academic Dishonesty	Excused Absence Policy for Undergraduates	Affirmative Action	Academic Probation and Suspension	Inclement Weather	Computing Services Acceptable Use	Sexual Harassment	Students with Disabilities	Dead Week	Academic Forgiveness	
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Course Description: From Catalog

This is a special topics course and does not have a description in the catalog. Below is a description of the course.

PIC Math (Preparation for Industrial Careers in Mathematics) is a program sponsored by the Mathematical Association of America (MAA), the Society for Industrial and Applied Mathematics (SIAM), and the National Science Foundation (NSF). The goal of the program is to engage math majors in industrial research as upper-classmen to expose them to problems outside of academia which are mathematical in nature.

In this course students complete mathematics projects derived from real-world problems. Students work in groups and research problems given by local businesses, industry, and government (BIG). This course mimics an internship – students learn to interact in a business setting, manage deadlines, produce technical documents, and think critically to find solutions. By the end of the course, each group produces a solution to their problem and completes a written, oral (video), and poster summary of their work.

The table below shows the following relationships:

How each student learning outcomes will be practiced and assessed in the course.

Course Student Learning Outcomes	How students will practice each outcome in this Course	How student achievement of each outcome will be assessed in this Course
Students will improve written and oral communication skills with respect to mathematics	draft reports and presentations	final paper and presentations
Students will improve ability to reason rigorously in mathematical arguments	research work and draft papers	final paper and presentations
Students will develop ability to undertake independent work	research work and presentations	final paper and presentations
Students will advance their level of critical sophistication	reading other works, drafts and presentations	final paper and presentations
Students will gain perspective on interplay of applications, problem-solving, and theory	research on their projects	final paper and presentations
Students will conduct research and make written and video presentations on various topics	draft papers and presentations	final paper and presentations

Required Texts, Additional Reading, and Other Materials

None Required, readings will be specified based on the student's project

Course Requirements / Due Dates

1. Meeting Reports: Due Sunday night after the meeting
2. Group Project Summaries: Due Sunday night before a liaison meeting
3. Individual Progress Reports: Due Friday night each week
4. Group (and Individual) Papers: Drafts due on February 17, March 9, and April 6. Final draft due on final exam day.
5. Group (and Individual) Poster and Presentations: Drafts due on March 16 and April 13. Final poster is due April 20. Final presentation is due on final exam day.

Grading Policy

Assignments	% (no Capstone)	% (w/ Capstone)
Progress Reports and In-Class Activities	20%	20%
Group Report Drafts and Final	35%	25%
Individual Report Drafts and Final	N/A	25%
Presentation Drafts and Final	20%	15%
Poster Drafts and Final	25%	15%

Attendance Policy

Attendance to all meetings are required unless given specific permission otherwise.

Course Topics

Course Schedule

Please see the following attached pages for more detail.

MTH 480: Research in Industrial Mathematics (PIC Math)

Specific Class Information

Instructor:	Dr. Michael Schroeder	Email:	schroederm@marshall.edu
Semester:	Spring 2016	Office:	Smith Hall 742F
CRN:	4091 (201)	Phone:	(304) 696-6643
Meeting Days:	MWF	Office Hours:	T 1:30PM-4PM, R 12:30-3PM
Meeting Time:	10:00AM – 10:50AM	Classroom:	Smith Hall 514

Course Description

PIC Math (Preparation for Industrial Careers in Mathematics) is a program sponsored by the Mathematical Association of America (MAA), the Society for Industrial and Applied Mathematics (SIAM), and the National Science Foundation (NSF). The goal of the program is to engage math majors in industrial research as upper-classmen to expose them to problems outside of academia which are mathematical in nature.

In this course students complete mathematics projects derived from real-world problems. Students work in groups and research problems given by local businesses, industry, and government (BIG). This course mimics an internship – students learn to interact in a business setting, manage deadlines, produce technical documents, and think critically to find solutions. By the end of the course, each group produces a solution to their problem and completes a written, oral (video), and poster summary of their work.

Learning Outcomes, Methods, and Assessment

In this course, there are six primary learning outcomes for students. Each are listed below, along with the means by which students will practice for each outcome and methods of assessment.

Desired Learner Outcomes/Objectives

Successful students will ...

- ▶ improve written and oral communication skills with respect to mathematics
- ▶ improve ability to reason rigorously in mathematical arguments
- ▶ develop ability to undertake independent work
- ▶ advance their level of critical sophistication
- ▶ gain perspective on interplay of applications, problem-solving, and theory
- ▶ conduct research and make written and video presentations on various topics

Practice and Assessment Methods

For practice and assessment, students will complete weekly assignments, including written and oral progress reports, given to the instructor and the industrial liaison. The final project, video presentation, and poster will be used for assessment.

Course Activities

In-Class Assignments

Students complete assignments which are tangential to their project, but are relevant to their skills learned in the course. Examples are sample written assignments, slide presentations, literature search results, etc.

Individual Progress Reports

Students are expected to submit weekly progress reports. In these reports, summarize the work completed during the previous week, outline future goals in the upcoming week, log your hours, and assess the work contributed by your group members. These will be submitted using MU Online.

Bi-weekly Group Project Summaries

Every other week, students prepare a report for submission to the industrial liaison. This will be graded and returned the class meeting before a liaison meeting for corrections, which will then be submitted to the liaison. These will be submitted using MU Online.

Bi-weekly Meetings with Industrial Liaisons

Students will have a professional meeting with their industrial liaison to outline progress, indicate future goals, and to ask questions. Professional attire is expected. These meetings may take place on campus or on-site.

Final Group Report

Each group produces a report outlining their project. This will include a introduction to the problem and justification for any solutions drawn. This must be at most 10 pages, without citations. Appendixes do not count toward the page count. This will be submitted to the MAA. These will be submitted using MU Online.

Final Group Poster

Each group produces a poster outlining their project. Students will present this poster at the end of the semester for local faculty and will present at a national mathematics meeting during the summer.

Final Group Presentation

Each group produces a slide presentation outlining their project. Students will convert this presentation into a recorded video presentation. The presentation must be at most 12 minutes in length.

Individual Paper (Capstone only)

Students gaining capstone credit must write an individual paper further investigating the mathematics from one aspect of their group project. The student selects the topic for their expansion by the end of the second week. These will be submitted using MU Online.

The Math Field Test (Capstone only)

Students receiving capstone credit must complete the Math Field Test. This is required for all math majors and your score on the test does not affect your grade in the class. Completion is all that is necessary. This will take place on Monday, February 29 and Wednesday, March 2.

Tentative Schedule

Progress Reports

Progress reports are due on Fridays of each week. These will be assessed and returned on Monday of the following week.

Bi-Weekly Group Project Summaries

Summaries are due on Fridays of the week before a meeting. These will be assessed and returned on Monday of the following week. Corrections must be made that day, and a corrected version will be relayed to the industrial liaison prior to the liaison meeting.

Bi-Weekly Liaison Meetings

Liaison meetings will take place on Wednesdays bi-weekly. The tentative schedule for these meetings are the following:

January 13, 2015	February 10, 2015	March 9, 2015	April 13, 2015
January 27, 2015	February 24, 2015	March 30, 2015	April 27, 2015

Dress appropriately for these meetings. These may be on campus, via Skype, or on-site depending on location.

Final Group (and Individual) Reports

Drafts of these report are due on **February 17**, **March 9**, and **April 6 at noon**. The last draft should only need minor corrections. The final paper(s) is/are due on **Monday, May 5, 2015 at noon**.

Poster and Presentations

Drafts of the poster and presentation are due **March 16** and **April 13 at noon**. The last draft should only need minor corrections. The final poster is due on **Wednesday, April 20, 2015 at noon**. The final presentation is due on **Monday, May 5, 2015 at noon**.

Course Tools

TeX

In the scientific community, TeX (pronounced “lay-tek”) is the common tool for producing documents. Typing in TeX is essentially a markup language (like HTML) which is math- and format-friendly. The software necessary to produce papers in TeX is open source and free to the public.

If you have a Mac, you can install MacTeX: (<https://tug.org/mactex>)

On Windows, you can install MiKTeX: (<http://miktex.org/download>)

Download and install the appropriate version of TeX on your machine. Tips and tricks on TeX will be covered in class. Students will compose all written assignments for this class in TeX.

Dropbox

Dropbox is a software program which provides cloud storage and allows collaborators to share files. Students need a Dropbox account. To create one, visit <http://www.dropbox.com>. Students will have a shared directory with all group members and the instructor. The instructor can assist with formatting and general TeX questions in this manner.

Other Software

Depending on the project, other software products may be needed. These will be made available to students either in a computer lab or on their personal machines. If you require such software, it is your responsibility to ensure you have access or find an alternative solution. Please see me if you have any questions regarding this.

Course Policies

Class Meetings and Attendance

Students must attend all class meetings, group meetings, and liaison meetings, or make arrangements with me and your group beforehand. Students must attend the poster presentation on Wednesday, April 27 at 4pm.

Class meetings will cover ancillary material to the projects, e.g. technical writing will be covered one day, giving a presentation another day, etc. As the semester progresses, meeting times may change to accommodate individual group meetings and will be decided upon by the groups.

Grading

Each course activity is graded. The final group report will have two rough drafts and a final draft due mid-semester. The poster and the presentation will each have one rough draft and final draft due mid-semester. The grading is as follows:

Assignments	% (no Capstone)	% (w/ Capstone)
Progress Reports and In-Class Activities	20%	20%
Group Report Drafts and Final	35%	25%
Individual Report Drafts and Final	N/A	25%
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University-Wide Policies

You are responsible for knowing all university policies, which can be found at

http://www.marshall.edu/academic-affairs/?page_id=802

About this Syllabus

This syllabus is subject to change at my discretion.