

MAT 349: Preparation for Industrial Careers in Mathematical Sciences

Course number: MAT 349

Course title: Preparation for Industrial Careers in Mathematical Sciences

Credits: 3:3

Prerequisites: Permission of instructor.

For whom planned: Undergraduate majors in mathematics and related disciplines.

Instructor information:

Instructor: Dr. Jan Rychtář rychtar@uncg.edu

Homepage: <http://www.uncg.edu/mat/faculty/rychtar/>

Office Hours (130 Petty): TR 12:30–1:45

Bulletin Description: This course prepares mathematical sciences students for industrial careers by engaging them in research problems that come directly from industry.

Student Learning Outcomes: Upon successful completion of this course, students shall be able to:

SLO1 Formulate the industrial problem in mathematical terms.

SLO2 Model certain aspects of the problem.

SLO3 Summarize the results.

Teaching Methods and Assignments for Achieving Learning Outcomes: Students will work in teams (3–5 members) on a project from an industrial company, non-profit organization, business or national laboratory. The whole class will meet once a week for a teacher’s lecture (weeks 1–2) and student presentations/discussions (weeks 3–15). Every team will also meet at least once a week with the instructor/faculty mentor and at least once a week without a faculty mentor. During the team meetings, students will coordinate the efforts and monitor progress towards the final product (written and oral reports providing solution to the client’s problem).

At the beginning of the semester, teams will choose an industrial problem, do a literature search and study the background of the problem. Then, the exact work will vary slightly depending on the particular problem, but typically will include the following:

- (1) formulate the problem in mathematical language
- (2) develop a long term (~10 weeks) and short term (~2 weeks) plans to solve the problem
- (3) code an appropriate computer simulation(s)
- (4) analyze existing data
- (5) provide solution to the problem
- (6) prepare oral and written reports to be presented in class and to clients
- (7) suggest further improvements and/or potential future work

| Timing | Project Component |
|-------------|--|
| Weeks 1–2 | Lecture on background and secondary research on clients, data, and research question. Team formation and project selection. |
| Weeks 3–4 | In depth look at research questions and data. Potential meeting with the clients. |
| Week 4–5 | Project team work begins. Preliminary data/strategy exploration, development of solution strategy proposal, and management timeline. |
| Weeks 6–10 | In depth analysis, project work, weekly status reports to class. Bi-weekly status/presentations to client. |
| Weeks 11–12 | Preliminary report and assessment of business value of project work. Continued work on finalizing project. |
| Weeks 13–14 | Preparation/practice of final presentations, written reports, and extensions of work. |
| Week 15 | Formal presentations to class and clients. Submission of final project products (Beamer presentation, written report, poster). |

Programming Skills: Writing computer codes and simulations will not be mandatory but highly recommended step towards solution of the projects. No specific knowledge programming language will be required but students will be encourage to learn the necessary skills during the project time line. Some programming skills may be learned from CodeCademy. <http://www.codecademy.com/>

Evaluation and Grading: The grades will be weighted as follows:

- 15% Class Participation / Team Meetings / Timesheets and journals
- 15% Team Evaluations / Personal Evaluations
- 15% Biweekly Presentations
- 15% Biweekly Reports
- 15% Final Presentation
- 15% Final Written Report
- 10% Poster

Team Meetings / Attendance / Class Participation: (SLO1, SLO2)

Team meetings will be frequently held in class. During each meeting, the group must summarize its progress and future directions. There may be additional team meetings set up with the industrial contact outside of class. Attendance at team meetings for the full duration is mandatory, both in class and those scheduled with the industrial contact. Tardiness and leaving early will be penalized.

Team and Personal Evaluations: SLO1, SLO2

After every biweekly report is submitted, each team member will evaluate all other members of the group. This report will include the contributions of each individual.

Timesheets and Journal: SLO3

Each student will keep track of the time spent on the project. The actual time spent on each of the following areas will be recorded and submitted biweekly:

- Team meetings outside of class
- Literature search
- Programming/coding

- Report writing
- Presentation preparation
- Other

Biweekly Presentations: SLO2, SLO3

There will be team presentations every two weeks. There will be a discussion after each presentation. Note that professional attire is not required for these presentations unless the industry sponsor is present or on a video call.

Biweekly Reports: SLO2, SLO3

There will be an up to date report submitted every two weeks. This report must contain the current state of the project, complete with references. It must also include a completed future work section with details of the direction of research.

Final Presentations and Reports: SLO3

There will be a 20–25 minute final video presentation on the last day of class. Each team member will participate in the presentation equally and dress professionally. The final written report will be submitted to the industry sponsor by the end of the class. Each team will also create a poster summarizing their project.

Required Text: Readings will be determined by the individual teams and will vary depending on research problem.

Rules of Client Engagement:

- Project Teams must direct all communication to client contacts through the faculty mentor (e.g., no direct contact with clients without approval of email messages).
- Meetings with clients either in person or through teleconference require respectful business casual dress.
- All presentations to clients must be approved prior to presentation. Don't get caught late in the game and be in a position where YOU have to tell the client you aren't prepared.
- Deadlines are deadlines—in order to complete a project within the scope of this semester we will need to attend to a consistent work ethic that includes **significant time OUTSIDE** of class.
- Nondisclosure forms must be signed and taken seriously. YOU risk bearing the responsibility of liability should the agreements be violated.

Academic Integrity Policy: Students are responsible for familiarizing themselves with UNCG's policy on issues such as cheating, plagiarism, misuse of academic resources, falsification and facilitation of dishonest conduct. Procedures and penalties related to these and other violations of the Academic Integrity Policy are found at:

<http://sa.uncg.edu/dean/academic-integrity/>.

These policies will be enforced in this class.

Attendance Policy: None.

Final Examination: None.

Additional Requirements: At least one student will be required to present the project at a professional meeting during Summer 2016 (funds to attend the conference will be provided for a limited number of students).

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