Syllabus: MAD 2502

Introduction to Computational Mathematics

Department of Mathematical Sciences
Charles E. Schmidt College of Science
Florida Atlantic University

Spring 2010. MAD 2502 (CRN 13301),
Introduction to Computational Mathematics, 3 credits.

Instructor
Rainer Steinwandt, Office SE 280
Phone: (561) 297-3353
Email: rsteinwa@fau.edu

Class Time and Place
Tuesday and Thursday: 3:30 – 4:50 p.m., BU 410.

Office Hours
Tuesday and Thursday: 9:00 a.m. – 11:00 a.m. or by appointment. Also, feel free to come
to the office anytime—whenever time permits, questions and discussions are welcome.
(If there should be any timing conflicts, like inevitable meetings during regular office
hours, this will be announced beforehand in class, whenever possible.)

Course Web Site
http://math.fau.edu/~srainer/MAD2502/

Required Text and Materials
The course will not follow a particular book, but but parts of the introduction to Python
will be based on the book by J. Campell, P. Gries, J. Montojo, G. Wilson: Practical
Programming. An Introduction to Computer Science Using Python. (The Pragmatic
Programmers, 2009). All required course materials will be provided in class or on the
course web site.

Course Objectives
The course provides an introduction to the use of computers for solving mathematical
problems. For this, the basics of the Python Programming Language (see
http://www.python.org) are introduced, and it is demonstrated how a programming
language can enable and support the solution of mathematical problems. The course does
not assume prior programming experience and does not aim at an in-depth understanding
of the details of Python. Rather the focus is on understanding concepts and techniques of
how programming can help to expand the spectrum of tractable mathematical problems.
After completion of the course, you should be acquainted with the use of different data types and programming concepts. You should be able to write simple programs in Python to solve computational problems from different areas within mathematics. At the end of the course, you should know how to process larger data sets, possibly stored in files at a remote location. Finally, this course should enable you to read more advanced material on Python, and prepare you to learn other programming languages or packages that are commonly encountered in computational mathematics.

**Lecture Schedule**

The following lists topics to be covered. The exact time frame per item varies (also in dependence of previous knowledge of the course participants), but a typical time frame is 2 – 4 weeks, including a discussion of applications. At the end of the semester, before the final exam, a review of the covered material will be provided.

1. Working with basic data types and built in functions
2. Conditional statements and loops
3. File processing
4. Working with sets and dictionaries
5. Implementing more advanced algorithms
6. Organizing larger programming projects

To the extent possible, suggestions of course participants for discussing specific topics or applications will be implemented.

**Assessment Procedures**

There will be five homework projects \{H_1, H_2, H_3, H_4, H_5\}, a midterm exam \(X_1\) and a comprehensive final exam \(X_2\). The scheduled dates and maximum number of points for each of these items are given in the following table.

<table>
<thead>
<tr>
<th>Item</th>
<th>Date</th>
<th>Max. points</th>
</tr>
</thead>
<tbody>
<tr>
<td>(H_1)</td>
<td>Jan 19, 2010</td>
<td>15</td>
</tr>
<tr>
<td>(H_2)</td>
<td>Feb 2, 2010</td>
<td>15</td>
</tr>
<tr>
<td>(H_3)</td>
<td>Feb 16, 2010</td>
<td>15</td>
</tr>
<tr>
<td>(X_1)</td>
<td>Mar 2, 2010</td>
<td>25</td>
</tr>
<tr>
<td>(H_4)</td>
<td>Mar 23, 2010</td>
<td>15</td>
</tr>
<tr>
<td>(H_5)</td>
<td>Apr 6, 2010</td>
<td>15</td>
</tr>
<tr>
<td>(X_2)</td>
<td>Apr 29, 2010</td>
<td>30</td>
</tr>
</tbody>
</table>

Exams will be given in class or as take-home exam. Homework projects and take-home exams will be assigned in class at the date specified above and are due on the date specified on the assignment. Late assignments will not be accepted and graded with 0 points.

Your overall grade in the course is derived from your cumulative performance as follows:
1. The two lowest scores achieved in the items \{H_1, H_2, H_3, H_4, H_5\} are dropped. The points from the remaining three items and of the two items \{X_1, X_2\} are added, yielding a final number of points \(0 \leq P \leq 100\).

2. Your grade is derived from \(P\) according to the following table.

<table>
<thead>
<tr>
<th>Value of (P)</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 94</td>
<td>A</td>
</tr>
<tr>
<td>&gt; 90 – 94</td>
<td>A−</td>
</tr>
<tr>
<td>&gt; 87 – 90</td>
<td>B+</td>
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<tr>
<td>&gt; 83 – 87</td>
<td>B</td>
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<tr>
<td>&gt; 80 – 83</td>
<td>B−</td>
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<tr>
<td>&gt; 75 – 80</td>
<td>C+</td>
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<tr>
<td>&gt; 65 – 75</td>
<td>C</td>
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<tr>
<td>&gt; 60 – 65</td>
<td>C−</td>
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<tr>
<td>&gt; 57 – 60</td>
<td>D+</td>
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<tr>
<td>&gt; 53 – 57</td>
<td>D</td>
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<tr>
<td>≥ 50 – 53</td>
<td>D−</td>
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<tr>
<td>&lt;50</td>
<td>F</td>
</tr>
</tbody>
</table>

Graded exams and homework projects will be returned in class or can be picked up during office hours at the instructor’s office. At the end of the course, the final grades will, in anonymized form, be available in front of the instructor’s office (room SE 280). Please keep all your exams and documentation of homework projects, so that a possible disagreement about your grade can be resolved.

**Make-up Tests and Extra Credit**

If you cannot attend an exam or hand in a homework project in time due to a relevant reason like significant health problems or being involved in a major traffic accident, and you document this, then you can make up the respective assignment. Extra credit work is not possible.

**Method of Instruction**

The course is conducted in lecture/discussion style. Assignments may require the use of a computer and programming. Unless otherwise specified, for these assignments you can use the hardware platform and operating system of your choice. Unless otherwise specified, the programming language to be used for all assignments is Python (see http://www.python.org/).

**Students with Disabilities**

In compliance with the Americans with Disabilities Act (A.D.A.) – Students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca – SU 133 (561-297-
3880), in Davie – LA 240 (954-236-1222), or in Jupiter – SR 117 (561-799-8585) and follow all OSD procedures.

**Incomplete Grades**

A grade of I (incomplete) will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU’s *University Catalog*. The student has to show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate.

**Classroom Etiquette and Academic Integrity**

Students are responsible for informing themselves about the Honor Code standards before performing any academic work—more detailed information is available at the URL [http://www.fau.edu/regulations/chapter4/4.001_Honor_Code.pdf](http://www.fau.edu/regulations/chapter4/4.001_Honor_Code.pdf). Scholastic dishonesty includes, but is not limited to, plagiarism and copying other’s work during an exam. Any exam or written assignment for which you are caught cheating will be marked as a zero grade, and the incident will be reported in accordance with Honor Code regulations.