

PHYS 640 Computational Physics

Fall 2020

Course Details:

Instructor: Prof. Zhibo Zhang
Phone: 979-997-6515
Email: Zhibo.Zhang@umbc.edu
WebEx: <https://umbc.webex.com/meet/zzbatmos>
Programming Language: Python
Texts: No official textbooks are required.

Recommended readings:

“Computational Physics: Problem Solving with Python 3rd Edition”

By R. H. Landau et al. Published by WILEY-VCH

Required resources needed for this course: 1) Internet access 2) Laptop or Desktop 3) WebEx account 4) access to commercial clouds (e.g., Google Drive, Box, Microsoft OneDrive)

Optional resources: 1) [Slack](#) account or [Microsoft Teams](#) account

Online teaching/learning in Fall 2020 due to COVID pandemic:

Due to the COVID-19 global pandemic, most of the courses of UMBC for the Fall 2020 semester will be offered online. Moreover, many incoming international students are not able to get visa and come to UMBC. All this creates a lot of challenges for teaching and learning. To migrate these challenges, this course will be delivered both **synchronously** and **asynchronously** to accommodate students from different time zones and/or with different technology accessibility. In addition, online collaboration tools, e.g., Slack or Microsoft Teams, will be used for office hour and discussion.

Synchronous Teaching/Learning through for students already in the United States:

Time: Wed and Fri 1:00 - 2:15PM

Format: WebEx (see information below)

PHYS640 Computational Physics Fall 2020

Hosted by Zhibo Zhang

Occurs every Wednesday, Friday effective 8/28/2020 until 12/11/2020 from 1:00 PM to 2:15 PM, (UTC-04:00) Eastern Time (US & Canada)

Meeting number: 120 260 1241

Password: dpEpNUui799

<https://umbc.webex.com/umbc/j.php?MTID=m46e83bc437d1b6316abc2e68c17e52a2>

Join by video system

Dial 1202601241@umbc.webex.com

You can also dial 173.243.2.68 and enter your meeting number.

Join by phone
+1-202-860-2110 United States Toll (Washington D.C.)
Access code: 120 260 1241

Asynchronous Teaching/Learning for students already outside of the United States:

Time: Flexible
Format: Recorded WebEx class video will be uploaded to Google Drive/Microsoft OneDrive for asynchronous learning

Synchronous office hours: Friday 2:30~4:00PM Through WebEx
Asynchronous office hours: by appointment or Slack/Microsoft Team

Learning Goals:

- **Get familiarized with Python as a programming language for numerical computation, data analysis as well as scientific visualization**
- **Learn how to solve physics problems using numerical techniques**
- **Learn how to analyze and visualize large amount of data**

Grading:

Homework: 40%
Midterm Projects: 15% each
Final Project and Presentation: 30%

score > 90 :A
score > 80: B
score > 70: C
score > 60: D
score < 60 : F

Topics:

- **Introduction to Python and scientific packages**
 - Anaconda/ Jupyter notebook
 - Numpy/SciPy
 - Matplotlib
- **Numerical techniques**
 - Monte Carlo method
 - Numerical Integration
 - Numerical Differentiation and Root Searching
 - Linear algebra and matrix computing
 - Differential Equations: ODE and PDE (if time permits)
- **Data Analysis:**
 - Probability and Statistical tests
 - Curve fitting
 - Time series analysis

- Principle component analysis
- **Advanced Topics (if time permits)**
 - Machine learning and Artificial intelligence
 - High performance computing

Academic Integrity By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Director.

Student Disability Services (SDS) UMBC is committed to eliminating discriminatory obstacles that may disadvantage students based on disability. Services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act (ADA) of 1990, the ADAAMA of 2009, and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would allow students to have equal access and inclusion in all courses, programs, and activities at the University. If you have a documented disability and need to request academic accommodations, please refer to the SDS website at sds.umbc.edu for registration information and to begin the process, or alternatively you may visit the SDS office in the Math/Psychology Building, Room 212. For questions or concerns, you may contact us through email at disAbility@umbc.edu or phone (410) 455-2459. **If you require accommodations for this class, make an appointment to meet with me to discuss your SDS-approved accommodations.**