

# ITCS 3145: Parallel and Distributed Computing

Erik Saule

## 1 Generalities

This syllabus contains the policies and expectations I have established for this course. Please read the entire syllabus carefully before continuing in this course. These policies and expectations are intended to create a productive learning atmosphere for all students. Unless you are prepared to abide by these policies and expectations, you risk losing the opportunity to participate further in the course.

The standards and requirements set forth in this syllabus may be modified at any time by the course instructor. Notice of such changes will be by announcement in class, by email notice, or by changes to this syllabus posted on the course website on canvas.

### 1.1 Course Description

Parallel and distributed computing is the use of multiple processors or computers to achieve greater performance. All computers today have multiple processor cores. Topics include: classification of parallel systems, programming parallel shared-memory systems, programming distributed-memory systems, patterns for parallel programming, foundation of parallel algorithms, and languages and tools for parallel programming.

### 1.2 Learning Outcomes

At the end of this class, you will be able to

- represent and analyze a parallel algorithm
- modify an algorithm for making a parallel execution possible
- program a parallel algorithm on a shared memory machine
- program a parallel algorithm on a distributed memory machine
- identify common problem that prevent the correct execution of a program in parallel

### 1.3 Location

Wednesday and Friday. At 12:30pm to 1:45pm. In CHHS 159

### 1.4 Instructor

Erik Saule. Woodward 210D. esaule@uncc.edu. 704 687 8580. Office Hours: Wednesday 2:30pm-4:30pm or by appointment (email preferred)

### 1.5 Teaching Assistant

Abhishek Chandratre. achand12@uncc.edu. Office Hours: Tuesday 9am-12pm, or by appointment. Woodward 230

Vivek Soni. vsoni3@uncc.edu. Office Hours: Monday 2pm-5pm, or by appointment. Woodward 230

## 1.6 Text(s)

None. See course slide for optional readings.

## 1.7 Course Topics

- Fundamentals of parallel computing
- Shared memory programming
  - pthreads
  - OpenMP
- Distributed Memory Programming
  - MPI
  - MapReduce MPI

## 1.8 Grading

Grading will be based on an absolute scale

About 10 assignments(66%). 1 midterm (12%). 1 final (12%).

Precise breakdown might change depending on how many assignments are actually given and other unforeseeable events.

## 1.9 Assignment & Project Submissions

Canvas will be used for assignment and project submissions.

## 1.10 Important Dates

Tentative dates:

- Midterm on ~~September 22nd~~ September 27th
- Final on December 13th.

# 2 Classroom Expectations

a) Students are expected to attend every class and remain in class for the duration of the session. Failure to attend class or arriving late may impact your ability to achieve course objectives which could affect your course grade. An absence, excused or unexcused, does not relieve a student of any course requirement. Regular class attendance is a student's obligation, as is a responsibility for all the work of class meetings, including tests and written tasks. Any unexcused absence or excessive tardiness may result in a loss of participation points.

b) The authority to excuse a student's class absence(s) and to grant a student an academic accommodation (turn in a late assignment(s), provide extra time on an assignment, reschedule an exam(s) etc.) sits with the individual instructor. Students are encouraged to work directly with me regarding their absence(s). The Dean of Students Office can assist faculty members in the verification a student's class absence(s) for documented situation related to medical, psychological, personal crisis, or military absences.

c) If I am late in arriving to class, you must wait a full 20 minutes after the start of class before you may leave without being counted absent, or you must follow any written instructions I may give you about my anticipated tardiness.

d) I will conduct this class in an atmosphere of mutual respect. I encourage your active participation in class discussions. Each of us may have strongly differing opinions on the various topics of class discussions. The conflict of ideas is encouraged and welcome. The orderly questioning of the ideas of others, including mine, is similarly welcome. However, I will exercise my responsibility to manage the discussions so that ideas and argument can proceed in an orderly fashion. You should expect that if your conduct during class discussions seriously disrupts the atmosphere of mutual respect I expect in this class, you will not be permitted to participate further.

e) The use of cell phones, smart phones, or other mobile communication devices is disruptive, and is therefore prohibited during class unless otherwise explicitly communicated for course purposes (e.g., use of clicker software from your smart phone). Except in emergencies, those using such devices must leave the classroom for the remainder of the class period. If unique circumstances are anticipated that necessitates the use of such devices, the course instructor should be notified prior to class to discuss proper etiquette given the unique circumstances. Each non-emergency occurrence will be counted as an unexcused absence.

f) Students are permitted to use computers during class for note-taking and other class-related work only. Those using computers during class for work not related to that class must leave the classroom for the remainder of the class period. Each such occurrence will be counted as an unexcused absence.

g) This 3-credit course requires 3 hours of classroom or direct faculty instruction and 6 hours of out-of-class student work each week for approximately 15 weeks. Out-of-class work may include but is not limited to: REQUIRED READING, LIBRARY RESEARCH, STUDIO WORK, PRACTICA, INTERNSHIPS, WRITTEN ASSIGNMENTS, AND STUDYING FOR QUIZZES AND EXAMS.

### 3 Tardiness or Absenteeism

Class Absence(s): The authority to excuse a student's class absence(s) and to grant a student an academic accommodation (turn in a late assignment(s), provide extra time on an assignment, reschedule an exam(s) etc.) sits with the individual instructor. Students are encouraged to work directly with their instructors regarding their absence(s). Note: The Dean of Students Office can assist faculty members in the verification a student's class absence(s) for documented situation related to medical, psychological, personal crisis, or military absences.

### 4 Academic Integrity, Plagiarism

All students are required to read and abide by The Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are set forth in the Code. The Code is available from the Dean of Students Office or online at: <http://legal.uncc.edu/policies/up-407>. The code will be strictly enforced and is binding on the students. Grade and academic evaluations in this course include a judgment that the student's work is free from academic dishonesty of any type; and grades in this course therefore should be and will be adversely affected by academic dishonesty. Students who violate the code can be expelled from UNC Charlotte. The normal penalty for a first offense is zero credit on the work involving dishonesty and further substantial reduction of the course grade. In almost all cases the course grade is reduced to an F.

Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work. As a condition of taking this course, all required projects and assignments may be subject to submission for textual similarity review to VeriCite (or other similar services, like MOSS or Turnitin) for the detection of plagiarism. All submitted projects will be included as source documents in the service reference database solely for the purpose of detecting plagiarism of such projects. No student papers will be submitted to this service without a student's written consent ([http://teaching.uncc.edu/sites/teaching.uncc.edu/files/media/VeriCite/VeriCite Limited Copyright Permission and FERPA Disclosure Consent Form.pdf](http://teaching.uncc.edu/sites/teaching.uncc.edu/files/media/VeriCite/VeriCite%20Limited%20Copyright%20Permission%20and%20FERPA%20Disclosure%20Consent%20Form.pdf)) and permission. If a student does

not provide such written consent and permission, the instructor may: (i) require a short reflection paper on research methodology; (ii) require a draft bibliography prior to submission of the final paper; or (iii) require the cover page and first cited page of each reference source to be photocopied and submitted with the final paper.

## 5 University Policy on Withdrawals

Students are expected to complete all courses for which they are registered at the close of the add/drop period. If you are concerned about your ability to succeed in this course, it is important to make an appointment to speak with the instructor as soon as possible. The University policy on withdrawal allows students only a limited number of opportunities available to withdraw from courses. It is important for you to understand the financial and academic consequences that may result from course withdrawal (<http://provost.uncc.edu/policies/academic/withdrawals>).

## 6 Inclusivity

**Preferred Gender Pronoun:** This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is indicated on the class roster, please let me know. Feel free to correct me on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me.

**Non-Discrimination:** All students and the instructor are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person's actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student Responsibility. Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct for possible conduct action.

## 7 Disability Accommodations

Students in this course seeking accommodations to disabilities must first consult with the Office of Disability Services and follow the instructions of that office for obtaining accommodations.

## 8 Sexual Harassment

All students are required to abide by the UNC Charlotte Sexual Harassment Policy and Grievance Procedures (available online at: <http://legal.uncc.edu/policies/up-502>) and the policy on Responsible Use of University Computing and Electronic Communication Resources (available online at: <http://legal.uncc.edu/policies/up-307>). Sexual harassment, as defined in the Sexual Harassment Policy and Grievance Procedures, is prohibited, even when carried out through computers or other electronic communications systems, including course-based chat rooms or message boards.

## 9 Title IX Reporting Obligations

UNC Charlotte is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these incidents, know that you are not alone. UNC Charlotte has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more.

Please be aware that many UNC Charlotte employees, including all faculty members, are considered Responsible Employees who are required to relay any information or reports of sexual misconduct they receive to the Title IX Coordinator. This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I must report the information to the Title IX Coordinator. Although I have to report the situation, you will still have options about how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone confidentially, you can contact any of the following on-campus resources, who are not required to report the incident to the Title IX Coordinator: (1) University Counseling Center ([counselingcenter.uncc.edu](http://counselingcenter.uncc.edu), 7-0311); (2) Student Health Center ([studenthealth.uncc.edu](http://studenthealth.uncc.edu), 7-7400); or (3) Center for Wellness Promotion ([wellness.uncc.edu](http://wellness.uncc.edu), 7-7407). Additional information about your options is also available at [titleix.uncc.edu](http://titleix.uncc.edu) under the Students tab.