Bucknell
UNIVERSITY

# Theory of Computation
CSCI 341, Fall 2016

# Syllabus

| Class | | Instructor | | Grade Calculation | |
|---|---|---|---|---|---|
| **Lecture** | M-W-F 11-12 am, Dana 137 | **Name** | Prof. Razet | **Programming assignments** | 20% |
| **Recit.** | Tues 4-5 pm Dana 137 | **Office** | 318 Dana | **Homework** | 20% |
| | | **Phone** | 577-3397 | **2 Midterm exams** | 30% |
| | | **Office Hours** | Open door | **Final exam** | 30% |
| | | **E-mail** | `bhcr001@bucknell.edu` | | |

## Course Description

CSCI 341 *Theory of Computation* is a course that explores the theoretical aspects of Computer Science. It delivers the solid mathematical foundation and proof techniques to study capabilities and limits of models of computation. A model of computation is a mathematical model describing a mechanism for computing. The models of computation range from the simple to the complex. In particular, we will study finite state automata (regular expressions), pushdown automata (context-free grammars), and Turing machines (recursively enumerable languages). We will show via proof techniques the capabilities and limits of these models, and show that certain problems are *unsolvable* by any model of computation. Among the problems that are solvable, we will differentiate between the ones that are tractable (solvable in polynomial time) and the others (whose solution might take too many resources to be effectively produced). This will lead us to the famous **P versus NP** problem and other important problems that emerged from this theory.

The course consists of lectures, recitations, homeworks and programming assignments. During the recitations we will study exercises that will further develop the topics explored in lecture. The programming assignments provide a hands-on programming experience with algorithms and models of computation from the course.

## Course Outcomes

1. Students will be able to show and manipulate the properties of formal languages and of models of computation, such as finite-state automata, pushdown automata, and Turing machines. (CSAB a)
2. Students will be to solve problems applying theory of computation techniques. (CSAB b)

## Course Materials

The course will follow the book:

*Introduction to the Theory of Computation*, 3rd Edition
Michael Sipser.
Cengage Learning, 3rd edition 2013.

The course has a website where I will post extra material, homeworks, solutions to problems, announcements...

`http://www.eg.bucknell.edu/~csci341/`

## Academic Conduct

The Computer Science Department has an Academic Responsibility policy posted on the department website at

`http://www.bucknell.edu/Documents/Engineering/ComputerScience/student-conduct-policy.pdf`

under student information. Students are also expected to read and abide by the principles clearly explained in the Student Handbook at `http://www.bucknell.edu/x1324.xml`. Please read all policies carefully.

## Homework assignments

The purpose of homework assignments is to exercise your mind in order to acquire a deeper understanding of the concepts covered in class. Also, homework assignments will give you a chance to solve problems similar to those that will appear on the exams. You should start working on assignments as early as possible. You should solve the problems by yourself and come up with your own solution to homework problems. If you have any questions or if you get stuck, it is an opportunity to talk to your instructor, who is more than willing to help. Only students registered to the course for this semester are allowed to talk about the homework, but they cannot exchange or even show each other written solutions to a homework assignment. You are not allowed to use any external source such as the Web, other textbooks, old solutions, family and friends, etc.

Homework assignments have to be returned to the instructor on their due date in paper form. They can be typed or handwritten. The handwritten option is recommended. In any case, multi-page hand-ins **must** be stapled. Dog-eared or loose pages will not be accepted.

The course website indicates homework due dates. Late homework will get a 10% penalty per day.

## Programming Assignments

Programming Assignments make you explore the material from a more practical point of view to improve your understanding. A typical programming assignment makes you implement and test a model of computation, a data-structure, or an algorithm we have seen in class.

## Exams

There will be two midterm exams and a cumulative final exam. Exam dates are indicated on the course schedule. A midterm can be moved with the unanimous consent of the entire class and the professor if the decision is made more than two weeks before the exam.