Theory of Computation (CS340)

Semester I, 2021-22

July 31, 2021

Course Logistics

- Instructor:
  Raghunath Tewari
  Room No. 514 RM Building
  email: *rtewari@cse.iitk.ac.in*
- Class Time: Mon and Fri: 8:00am – 9:00am, Tue: 9:00am – 10:00am.

  Lectures will be delivered in a prerecorded mode. I had recorded lectures for this course as part of NPTEL and I will be using those set of lectures in this course.
- Discussion Hour: Fri 8:00am.

  Zoom Meeting Link:
  https://iitk-ac-in.zoom.us/j/91766616024?pwd=OFYyM1QrVmRnMDNaQXc4dldjL1lnUT09

  We will use the above meeting link for any meeting related to this course.
- Course Textbook: *Introduction to the Theory of Computation*, by Michael Sipser.
- Teaching Assistants:
  - Chandra Shekhar Tiwari (chandrat@cse.iitk.ac.in)
  - Diptajit Roy (diptajitr@cse.iitk.ac.in)
  - Jagriti Singh (jagriti@cse.iitk.ac.in)
  - Neelabjo Shubhashis Choudhury (neelabjo@cse.iitk.ac.in)
  - Randeep Kumar Sahu (randeeps@cse.iitk.ac.in)
  - Ronak Bhadra (ronakb@cse.iitk.ac.in)

Course Syllabus

- Models of computation – classification, properties and equivalences.
- Regular languages models: finite state machines (deterministic and non-deterministic), regular grammars, regular expressions, equivalence of deterministic and non-deterministic machines and of the three models. Properties: closure, decidability, minimality of automata, iteration theorems.

- Context-free languages models: grammars (including different normal forms), pushdown automata, and their equivalence. Properties: closure, iteration theorems, parsing.
- Recursive and recursively enumerable sets models: Turing machines, grammars, recursive functions, their equivalence. Church's thesis. Properties: closure, decidability, undecidablity/non-computability, notion of reductions.

Testing and Grading

Your grades will be based on class participation, homework assignments, quizzes, a mid semester exam and a final exam. The following table gives a guideline for evaluating your final grade.

Course Component	**Weightage**
Homeworks	20%
Quizzes	20%
Mid Semester Exam	20%
Final Exam	40%

Other Information

- Pre recorded lectures will be posted every week on the course webpage.
- In addition to that, we will have a weekly discussion session every Friday at 8am.
- All course information will be conveyed via the course mailing list.
- There will be 4 assignments distributed over the semester. You will be given about 7-10 days to complete each assignment. Late submissions are strongly discouraged and will be penalised.
- There will be around 2 quizzes in this course.
- Plagiarism in any form such as cheating, copying, lending your work to others, etc., is very strongly discouraged and will be heavily penalised.
- There will be NO makeup quizzes/exams unless under extreme circumstances, which is solely upon the discretion of the instructor.
- Clarity and legibility of your solutions are as important as the solution itself.
- It is strongly encouraged that you attend all lectures.
- All course information will be conveyed via the course mailing list.