

In this project, your team will research, design, and implement two or more scheduling algorithms or models to solve a problem of your choice. Each member of the team is expected to contribute equally to the project though perhaps in different roles.

The project requires:

- **finding a scheduling problem.** Sources can be the academic literature (e.g., the *Journal of Scheduling*, other OR journals) or real-world experience (e.g., PEY). The problem choice is up to you but it needs to be non-trivial: *choosing a problem that does not require much effort will negatively affect your mark in a significant way.* Problems must be approved by the instructor.
- **finding or generating problem instances.** You will need to test and compare your solution methods on a number of instances of your scheduling problem (10 or more). The data for these instances (e.g., number of activities, processing times, number of resources, temporal relationships among activities) should be different for different instances. You should be able to justify why your instances are “interesting”.
- **writing code to read in a problem instance** (from a file or database). Hard coding the problem instances into the source code will result in a substantial mark reduction.
- **writing code to solve the problem instance** with two different algorithms/models. The algorithms/models should be sufficiently different. Reasonable options include any two of mixed-integer programming, tabu search, simulated annealing, constraint programming, and a set of dispatch rules. At most one of your two algorithms/models can be a dispatch rule.
- **writing a report** to present the problem definition, solution approaches, results of your experiments, and conclusions. All submissions **must** be in LNCS format and at most 15 pages long. You can find a specification of the LNCS style as well as Latex and Word templates at:
<http://www.springer.com/computer/lncs?SGWID=0-164-6-793341-0>
Failure to follow the appropriate format will result in the report being returned to you for re-formatting – *late penalties will be applied.*
- **presenting your work in a formal academic oral presentation** (10 – 15 minutes)

The project is something your team will be doing on its own. You will need to research your topic and you will need to teach yourself to use the appropriate tools. The tools will not be directly taught in the class or tutorial.

Plagiarism & Talking to People Outside Your Team

As you hopefully know by now, it is an offence “to represent as one’s own idea or expression of an idea or work of another in any ... form of academic work” (<http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppjun011995.pdf>, p. 3). Included in this is the use of proper citations of your sources in your project. The basic idea is that if your ideas, data, implementations, or claims come not from you but from some outside source, you need to clearly reference that source. I recommend “How Not to Plagiarize” (<http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>) as well as talking to the instructor if you are in doubt.

Similarly, having someone else do your project or portions of your project is academic misconduct. “Collaboration” with any person outside your team is considered cheating. This does not mean, however, that your project is top secret and that you cannot talk about it with classmates. Discussions, brainstorming, and suggestions of references to consult are all part of normal collegial work. However, there is a line that cannot be crossed. Using code or text from a non-team member (or providing code/text to another team) is well over that line. Again, if you are in doubt, talk to the instructor.

Any instances of plagiarism or contributions from non-team members will be dealt with to the full extent of university regulations. Proper citation of existing literature is required.

COVID-19 and Online Delivery

Based on feedback (in another course) from the Spring 2019 semester, team projects are more challenging in an online course. Since you will not be seeing your team-mates in person, it is significantly easier to ghost them (or to be ghosted by them). And, as with other course components, it also may be more difficult for you to manage your time and to maintain the motivation you need.

You should be prepared for these extra challenges and discuss in your team how to deal with them. It is important to develop a sense of common and individual responsibility as well as being understanding for team members who are going through difficulties.

You are encouraged to contact the instructor as early as possible if your team is encountering difficulties.

Deadlines

Teams

Due Date: Sept 27, 2020, 23:59

A short electronic document (PDF or just an email) is to be submitted by email to the instructor. The document should include the name, id#, and email address of each member of the team. **The email MUST be CCed to each member of the team** (so that I know everyone has agreed to be on the team).

Notes:

- Teams must consist of 4 or 5 members. No exceptions.
- Anyone not on a team by the deadline will be placed on a team by the instructor.
- The instructor will not break-up teams (of 4 or 5) that are formed by the deadline. If you have a team of only 4 members, an additional member may be added. If you have a team of 3 members, you may be split up.
- Team composition is final. You may not change teams.
- You are encouraged to use the introductory video (see Course Syllabus and Quercus) and the discussion board to “advertise” for team members.

Problem Definition

Due Date: Oct 11, 2020, 23:59

A PDF document is to be submitted (via Quercus) defining the problem that will be solved. You should submit a formal, mathematical definition as well as text that explains the problem (math is for precision, English is for explanations).

Notes:

- The document does not have to be in any special format (except being a PDF). Length, content, form, etc. is up to you.
- You are strongly encouraged to consult with the instructor about your problem before the deadline as the problem needs to be at the right level of difficulty (not too hard, not too easy) and should be sufficiently different from problems other teams are addressing.

Preliminary Results

Due Date: Nov 8, 2020, 23:59

A PDF document is to be submitted (via Quercus) providing preliminary results of running your system on your problem instances. Your goal in this document is to present data that compares the two approaches that you have selected. Graphs with accompanying textual description are recommended.

Notes:

- The document does not have to be in any special format (except being a PDF). Length, content, form, etc. is up to you.
- Please include a problem definition (again) in your document.

Oral Presentation

Due Dates: Dec 4 – Dec 9, 2020

A 10 to 15-minute presentation will be done by one or more members of the project team. The presentation should include a brief system demo and provide an overview of the problem, algorithms, results, and conclusion of your project. The presentation will be done via BB Collaborate

Notes:

- The presentation should be a formal academic presentation.
- Marks will be based on both the content and the quality (e.g., organization, clarity and enthusiasm of the speaker, usefulness of visual aids such as slides) of the presentation.

Final Report

Due Date: Dec 9, 2020, 23:59

The final report focuses on the evaluation of the algorithms you have implemented to solve the problem you have chosen. The report is expected to contain: the names and ID#s of all team members, an introduction, a formal problem definition, a formal description of your algorithmic methods (e.g., a formal mathematical model), detailed description of your experiments, detailed results of your experiments, discussion of your results, conclusions, and a bibliography. The report should **not** contain information about the “process” of the project (who did what, how much time did it take): it is about the results not the process.

Your submission should be made via Quercus in a zip file containing:

- The PDF of your final report. **Only PDFs will be accepted.**
- The commented source code for your project together with a “readme” file that gives a short overview of the code organization.
- The PDF or Powerpoint file containing the slides used in your final presentation.

Notes:

- **The report is due at 23:59 on Dec 9.**
- All submissions must be in LNCS format and at most 15 pages long. You can find a specification of the LNCS style as well as Latex and Word templates at:
<http://www.springer.com/computer/lncs?SGWID=0-164-6-793341-0>
- Both the quality writing (e.g., spelling, grammar, clarity) and the content of the report will be marked.
- The usual academic standards regarding citations of the existing literature work you have used in your research are expected. (See above)
- 55% of the final project mark is based on the contents and quality of the report (see Marking Scheme below).

360 Degree Review

Due Date: Dec 9, 2020, 23:59

Each team member will *individually* create a 360 degree review of the project process and team members. Each review should contain the team members description of the distribution of responsibilities and work in the project and a detailed analysis of the contributions of each team member, including a self-assessment.

Notes:

- **The review is due at 23:59 on Dec 9.**
- Your submission should be made via Quercus in a PDF file.
- Teams are encouraged to maintain shared documents (e.g., meeting minutes) during the project process that can inform the review. Such documents should not be included in the review but must be made available to the instructor upon request.
- The instructor may adjust individual project marks based on the 360 reviews.

Project Marking Scheme

Deliverable	Value (% of project mark)
Teams	0
Problem Definition	5
Preliminary Results	10
Oral Presentation	25
Final Report	55
Final Report Itself	20
Problem and Instances	5
Algorithm 1	10
Algorithm 2	10
Code	10
360 Degree Review	5
Total	100

Late Penalties

“Zeno” late penalties will be applied: for every day late, half of the remaining value of the marks of the deliverable will be deducted. **This applies to all the deliverables!** For example, for the final report the downward trend is as follows:

Time submitted	Maximum remaining value
00:00 Dec 10 – 23:59 Dec 10	27.5 (i.e., $55/2$)
00:00 Dec 11 – 23:59 Dec 11	13.75 (i.e., $55/2^2$)
00:00 Dec 12 – 23:59 Dec 12	6.875 (i.e., $55/2^3$)
etc.	