Warning

Make sure you are viewing the correct slide deck (gold highlights) that is applicable to the semester for which you are considering starting UROP, as requirements may change.

This deck is for AY 21/22 Sem 2, presented on 2 March 2022, for prospective UROP students formally starting in August 2022.
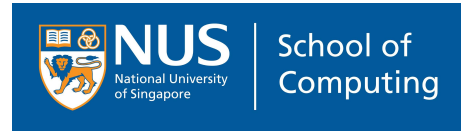
From: uiowa.edu

From: vumc.com

Slides: bit.ly/soc-urop-2120
Video: bit.ly/soc-urop-2120yt

NUS SoC UROP Briefing

AY 2021/2022 Sem 2

Presented by Kan Min-Yen
Assisted by Ms Ivy Ng
(Revised 21 February 2022)

Objective

Allows undergraduates to participate in active research and to experience first hand the challenges and exhilaration of research, discovery and invention.

Typically, research involves these activities:

- Problem formulation;
- Literature survey;
- Attending research seminars;
- Proposal and implementation of solutions and their evaluation; and
- Documentation and presentation of results.

CP3209 UROP @ SoC

Prerequisites

- Have at least 60 MCs in progress/completed by the application time point.
- Minimum CAP of 3.8
- Approval of CS/IS department

Timelines

Activity	Deliverables
1. Continuous Assessment : CA Report a) Deadline for submission of CA report to supervisor and main evaluator. b) Presentation to supervisor and main evaluator.	a) Wed, Week 12, Sem 1 b) Reading Week, Sem 1
2. Final Assessment Deadline for submission of **Final Report**	Wed of Week 12, Sem 2
3. Presentation	Reading Week, Sem 2
4a) Submission of **Feedback** of UROP Guidance and Evaluation 4b) Submission of **e-copy** of Final Report	First Mon after Exams, Sem 2

Evaluation

30% Continuous Assessment (Interim Progress Report)	
15% Supervisor	30% Understanding of the problem 40% Technical Achievement 10% Project and Resource Management 20% Report and Discussion
15% Main Evaluator	

70% Final report & Oral Presentation	
35% Supervisor	20% Understanding and formulation of the problem 10% Extension of knowledge 30% Methodology, Implementation and Analysis 20% Report 20% Effort & Initiative
35% Main Evaluator	

If the supervisor and main evaluator agrees that the student can continue the project, you will be automatically registered for CP3209 next semester; and will receive an 'IP' grade for this semester.

Schedule <mark>(Sem 2 AY21/22)</mark>

7 March 2022: UROP applications open

- Submit the UROP application via the online application form here.
- You will be informed via email once your application is processed.

14 April 2022: UROP applications close

Finding Projects

Approach the faculty!

- Browse both the UROP and FYP project lists at https://mysoc.nus.edu.sg/~projadm/
- Talk with any faculty that whose area is of interest to you.
- You should look through projects and ask the faculty to propose something similar.

You can also propose your own project. You will still need to find a professor to supervise you.

Bottom line: Take the initiative to find the best project and mentor that fits your interests and advising style

bhojan	U135220	Sword Ordinal Code(SOC): Mobile Augmented Reality game to learn algorithms and coding
bhojan	U135210	Procedural content generation for games using machine learning techniques (proposed by Ubisoft)
bhojan	U135190	Visually Improved Erosion Algorithm for the Procedural Generation of Tile-Based Terrain
bhojan	U135230	Open-ended project - [using Hololens AR toolkit]
bhojan	U135250	AR Smart Glasses - Building and Experimenting Applications for AR Smart Glasses and Evaluating the HCI Aspects
bhojan	U135200	Game for Fitness with Sensor based DDA
bhojan	U135240	Open-ended project on AI and ML for Game Development - [Sponsored and CoSupervised by Ubisoft, Singapore]
bhooi	U261060	Teaching Computers to be Surprised: Deep Learning-based Time Series Anomaly Detection
bhooi	U261070	Adversarially Robust Methods for Deep Learning-based Anomaly Detection
bhooi	U261090	Predicting Side Effects of Drug Combinations using Deep Learning

chancy	U024260	Supporting Cardinality Constraints in Database Systems
changec	U004550	Adversarial Machine Learning
changec	U004540	Enhance Cybersecurity with Intel SGX and Trusted Platform Module
changec	U004560	Virtual Cyber-physical power system for cybersecurity experimentation
changec	U004570	Secure collaborative decision making and data sharing
diptarka	U265020	Learning in Algorithms
diptarka	U265030	String Clustering: Finding Edit Similarity over Large Dataset

What is the difference between UROP and FYP?

As explained to the faculty:

<u>UROP</u> Typically students selecting UROP have higher CAP (due to requirements of the programme) and more motivation towards research than FYP.

However, UROP students also usually have less background and substantially heavier workload than their FYP counterparts. UROP is only required for CS Turing programme students, who focus on research, but is open for any SoC student to take up.

UROP students typically take the 8 MC version and are expected to work the ***full year***, not just term time, on their projects. Some UROP projects can extend into a follow up FYP.

<u>FYP</u> is a 12-MC (full year) programme for final year students. FYPs may be research-oriented, but can also be **any other type of project, including implementations and team projects**, which have been suitably divided among participating team members. FYP students are typically 4th year students and have fewer courses to complete, so may have more background for projects and more time.

It is **required** of students in the CEG programme, but is open to all SoC students. However, students from CS Department who aim for Honours (Highest Distinction) must pass the FYP.

FYP and UROP Support

Many research projects require small amounts of computational resources, hardware, software or stationery. To defray these costs, the SoC Exco has approved a budget of up to S$200 for the Undergraduate office to administer to help principal investigators claim such expenses.

The general rules are simple:

- Limited to one reimbursement request per student, up to a maximum of 5 students per supervisor.
- Expenses must be definitely related to the project, determined at the discretion of the FYP and UROP coordinators (currently, Terence and Min).
- Multiple supervised students **can be combined** to claim for a larger expense.
- Claims to be made directly by the supervisor.

Feedbacks from UROP students:

What have you learned from UROP?

Taught me a great deal about research in information theory and statistics - **Nelvin Tan**

Research skills, time management, mathematical skills - **Ong Kuan Yang**

I have learnt to formulate my research topic and work towards a publication. That is beneficial if one wants to delve into academia - **Eugene Lim**

How to digest research papers, as well as write your own. Being directed to resources and possibly even experts on the topic, to increase your own expertise. Experience in submitting a paper and getting reviews in a real conference - **Lim Fong Yuan**

Feedbacks from UROP students:

Tips?

Excellent opportunity if you want if want to learn more about research or plan to do research in future - **Nelvin Tan**

Find a topic that you like - **Ong Kuan Yang**

Time and workload management is important **- Kong Zijin**

Unless you really know what you're doing, don't take any open projects, because in there, you will be calling all the shots yourself. Ask your prospective prof to send you some research papers to read, before you decide if that's a project you're into. - **Lim Fong Yuan**

Prof Trevor Erik Carlson

We have been extremely happy with the work that we have done with our UROP students. Together, I work to treat our researchers as close member of our team, and through collaboration and drive by the students, we have published papers and our work has formed the basis of new research projects. Together, we have built new AI accelerator hardware and designed new AI algorithms to improve the speed and efficiency of AI systems. Overall, I've been very impressed by the work the students can accomplish, and they have, and will continue to make an impact as a part of our research group.

Miss Ran Yiding

UROP has been a meaningful experience to me. I started knowing nothing about recommendation system, but ended up building a module recommendation system that allows for learning analytics. I did not only learn more about this area but also gained skills to conduct independent research in other field.

Module Recommendation System
Supervisor: Prof Kan Min-Yen

Mr Kyle Timothy Ng Chu

UROP has been a meaningful experience to me. I started knowing nothing about recommendation system, but ended up building a module recommendation system that allows for learning analytics. I did not only learn more about this area but also gained skills to conduct independent research in other field.

You Only Spike Once: Improving Energy-Efficient Neuromorphic Inference to ANN-Level Accuracy
Supervisor: Trevor Erik

Mr Gabriel Yeo Fang Yan

"UROP was a trial for me in my personal journey that repaid itself in many ways. It renewed in me a curiosity and an appreciation for deeply theoretical work, and gave me the confidence to pursue more technical areas of computer science at a higher level. I am thankful I had the opportunity to work with Assoc. Prof. Ooi Wei Tsang, who nurtured my development and gave me direction. I highly recommend the program to students with any interest in exploring the fundamentals of computer science or those looking for a challenge."

Scheduling and Routing Algorithms for Last-Mile Delivery using Autonomous Robots
Supervisor: Dr Ooi Wei Tsang

Mr Zhang Xiaoyan

I did a recursion theory project supervised by Professor Stephan. He introduced concepts and examples, and then provided problems for me to solve. These problems with hints became gradually deeper and harder, and gave me a good experience exploring the world of logic.

Structure of 1-degree inside m-degree
Supervisor: Dr Stephan Frank

Mr Nguyen Dang Phuc Nhat

Prof Trevor's group is an ideal place to learn to do research as an undergraduate. Here, you'd have very frequent feedback and collaboration opportunities with graduate students and even more mature researchers. The best thing is that Prof has incredibly positive energy that would definitely make you feel welcome and motivated to tackle challenging research problems.

Investigation of ANN-converted Spiking Neural Networks
Supervisor: Dr Trevor Erik Carlson

Mr Ong Kuan Yang
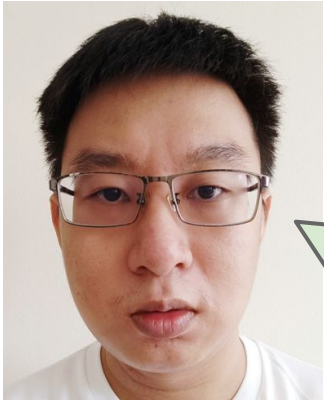
UROP was a rare opportunity for me to try my hand at independent (but guided) research at an early stage in my undergraduate studies.
It allowed me to experience for myself what research can be like and it was what led to me doing a PhD after graduating.
I encourage students who are at all interested in research to try it, as there is little cost incurred but potentially huge benefits to be gained.

Inductive Inference with Severe Constrains
Supervisor: Dr Stephan Frank

Mr Quang Minh Hoàng

Although every step along the way was a trial to overcome, UROP was an enriching and transformative experience. By giving me the chance to work on cutting-edge problems, not only did UROP prepare me with ample technical knowledge in the field of machine learning, it had also helped me to obtain valuable skills such as problem formulation, problem solving and critical thinking. Most importantly, through working closely with brilliant mentors, I was able to cultivate a passion for academic research, which plays an important role in defining who I am today.

Scaling up Gaussian Process Inference for High Velocity in Big Data
Winner of Outstanding Undergraduate Researcher Prize for AY15-16
Supervisor: Dr Bryan Low

Mr Harta Wijaya

"UROP gives me the opportunity to work on an exciting cutting-edge research project. I really enjoy the meaningful experience working on the project. For those who loves challenges in doing research, UROP is the way to go."

Statistical Machine Translation
Supervisor: A/P Ng Hwee Tou

FAQ and Issues

Q: In LumiNUS, there is a slot for UROP lectures. What is that and what happens if it conflicts with another module?

A: We sometimes have to create "dummy" modules to allow the timetabling system to mount the course. Don't worry, there are no UROP lectures. If you find that another course conflicts with it, we can manually register you for UROP (if bypassing ModReg; please approach the UROP administrator in the undergraduate office for assistance.

Q: Is UROP graded on the final report submitted to the digital library at the very end of UROP, or based on the report we hand in for examination? If the examiner asks for edits, are they compulsory and accounted in the final grade?

A: Your grade for UROP is partially based on the report that you turn in to the examiners. Unless otherwise communicated to you by your examiners or supervisor, further changes to the thesis for the archival copy in SoC's digital library are not considered for your grade.

Q:I heard that hardcopy is no longer required for the reports. Is that true?

A: Yes. The workflow for reports has been revised. Students need to distribute their report directly to the examiners in softcopy by default. If an examiner requests hardcopy, you will be required to furnish it. Reports will still need to be uploaded to LumiNUS for timestamping purposes.

Q: Are exchange students allowed to take part in UROP?
A: Yes, exchange students can take part in UROP. But since exchange is typically for a single semester, we encourage students to take CP3106 Independent Project instead. Exchange students wishing to participate in UROP will need to discuss their particular schedule with their prospective supervisor.

Reminder

- With immediate effect (Semester II AY19/20), single-semester UROP is discontinued.   Students keen on single-semester research are asked to enrol for **CP3106 Independent Project instead**.

- Students doing UROP will be registered as a year-long module, spread over 2 **consecutive** semesters.
  - This means that UROP students cannot go for NOC or SEP, during UROP.

Contact Information

http://www.comp.nus.edu.sg/undergraduates/urop_project.html

Coordinator: A/P KAN Min-Yen
<kanmy@comp.nus.edu.sg>, 05-12, AS6

Administrator: Ms Ivy Ng
<ivyng@nus.edu.sg>, UG Office

Thank you!

Reminder: Applications close **14 April 2022**