



# INTEL REQUEST FOR PROPOSALS (RFP)

## SUBJECT

The Intel University Research and Collaboration Office (URC) requests proposals for academic curriculum development focused on quantum science and engineering using *the beta version (preview) of the Intel® Quantum Software Development Kit (SDK)*.

## KEY DATES

**Proposal Submission Deadline (PIs): July 20<sup>th</sup> , 2022**

**Response Date to Proposal (Intel): August 10<sup>th</sup> , 2022**

## OVERVIEW

The Intel University Research and Collaboration Office (URC) invites proposals from academic faculty to develop curriculum focused on quantum science and engineering using the Intel Quantum Software Development Kit (SDK). The goals of this program are to:

1. Partner with the academic community to develop curriculum that embraces Intel technology to educate undergraduate and graduate physics, computer science, computational science and electrical and computer engineering students on quantum computing concepts.
2. Develop a pipeline of capable students for the ecosystem who understand quantum technology challenges and how Intel solutions can help address these problems.

The objective is to raise awareness within the academic community of Intel quantum technologies and their capabilities for teaching emerging computing

concepts. By partnering with faculty, Intel plans to augment and develop curriculum at universities that expose students to challenges currently faced within the technology industry. This initiative aims to encourage a culture of faculty collaboration through sharing of curriculum content for incorporation into college and university course syllabuses throughout the broader academic community.

Specifically, this solicitation calls for the development of curriculum modules targeting undergraduate and graduate education with each module consisting of one to two lecture series with a laboratory or exercise component. Example topics of interest may include, but are not limited to, the following:

- Principles of quantum computing
- Development of quantum algorithms (both quantum kernels and hybrid quantum-classical) using the Intel Quantum SDK
- Quantum compilation techniques and challenges: decomposition, scheduling, routing, mapping, etc.
- Ongoing research in quantum computing and the architecture of quantum computers.

This solicitation affords the proposer to become familiar with the utilization of the Intel Quantum SDK, a software package available in the Intel DevCloud that allows users to interface with the Intel quantum computing stack. It includes an intuitive user interface based on C++, an LLVM-based compiler toolchain with a runtime environment adapted for quantum, and a high performance Intel Quantum Simulator qubit target backend. Future releases of the Intel Quantum SDK will feature different qubit target backends, including a Quantum Dot Qubit simulator. Eventually, the option of using a real Intel quantum dot qubit device as the target backend will also be offered.

#### **Access The Intel Quantum SDK:**

1. [Sign up for Intel® DevCloud](#)
  - a. Complete the email confirmation step
2. [Register at Intel® Communities](#) or use your Intel credentials to log in,
  - a. be sure to set a Display Name by visiting [Intel Communities](#).
3. Complete this [SDK registration form](#) to gain access to the SDK.

## PROGRAM SCOPE AND FUNDING

Intel URC intends to sponsor proposals lasting 6-12 months focused on the development of curriculum modules consisting of one to two lecture series with laboratory or exercise component.

The program targets curriculum for undergraduate and graduate students with a focus on courses devoted to quantum computing.

- Curriculum developed under this initiative should be piloted in a classroom setting at the college or university.
- Proposals have flexibility to identify the most appropriate course intercept for the targeted material based on course teaching imperatives and prerequisites. This RFP specifically targets undergraduate and graduate level physics, computer science, computational science, and electrical and computer engineering courses.
- Proposals that target integration of one or more of the highlighted quantum computing concepts are of considerable interest.

Curriculum developed under this initiative is intended to be provided to the academic community with open access for multiyear use:

- In funding this proposal, Intel requests that the content hosted on university or faculty websites allows access to the broader academic community to incorporate into their respective course syllabuses.
- Intel requests that faculty will allow Intel the right to host their course content link and associated course description on [Intel® Developer Zone](#) and university program websites.
- Proposals that have identified paths to disseminate curriculum within the broader academic community through workshops, conferences and other collaborative partnerships are of considerable interest.

The level of sponsorship is expected to be around \$25K to \$50K, depending on the availability of funds and the breadth and quality of the proposals. All proposals must justify the proposed budget in terms of the resources needed to carry out the proposed work.

## PROPOSAL FORMAT

Individual proposals should be three to five pages and should follow the format provided in the attached Intel University Research and Collaboration Office

Proposal Template. All proposals must elaborate on the faculty expertise in the relevant areas. Proposals will be competitively reviewed by an advisory committee.

## EVALUATION CRITERIA

The evaluation criteria for this solicitation are as follows:

1. **Potential contribution and relevance to Intel and the broader industry:** The proposed curriculum should directly address teaching imperatives in the area of quantum computing and utilize Intel Quantum SDK to address technology challenges relevant to Intel and the broader industry.
2. **Technical merit:** The extent to which the proposed curriculum is technically feasible to address the targeted teaching imperatives.
3. **Qualification of participating faculty:** The extent to which expertise and prior experience bear on the problem at hand. Please elaborate on relevant experience in the targeted domain and any notable teaching recognitions.
4. **Potential for scalability:** Proposals that have identified paths to disseminate curriculum within the broader academic community through workshops, conferences and other collaborative partnerships will be given significant consideration (e.g., multiple course offerings, number of students impacted, adoption by other universities/organizations, online course offerings, participation in relevant education conferences/workshops).
5. **Potential for broader impact:** Intel supports the advancement of computing education and diverse participation in STEM. Proposals are encouraged to elaborate on how the proposed work is anticipated to impact student education on campus and/or the broader academic community. Proposals that support diverse participation in engineering education will be given significant consideration.

**Note:** As an industry leader, Intel pushes the boundaries of technology to make amazing experiences possible for every person on earth. From powering the latest devices and the cloud you depend on to driving policy, diversity, sustainability, and education, we create value for our stockholders, customers, and society. Intel expects suppliers in our supply chain to be strong partners in making Intel

successful through support of Intel's goals and commitments to diversity, sustainability, and education.

In light of Intel's strong commitment to diversity and creating an inclusive environment, in your proposal please address: (a) your organization's commitment to diversity and inclusion with respect to race, national origin, gender, veterans, individuals with diverse abilities and LGBTQ, (b) a summary of your performance in this area and any initiatives you are pursuing, and (c) the diverse team you propose for this project, including leadership, support, and any subcontracting you propose (such as to minority- or women-owned businesses).

## ELIGIBILITY

This RFP is open to faculty from academic institutions that have been specifically invited to participate in the proposal process. Any questions regarding eligibility should be directed to Mindy Murdock (contact info below).

## INTELLECTUAL PROPERTY

---

The final award terms are expected to follow a public dedication model, which is Intel's preference, with some possible exceptions as Intel determines. Under a typical public dedication model, Intel and the higher education institution jointly agree that all academic curriculum and research in the program be placed in the public domain (all IP, including, patentable inventions dedicated to the public and source code distributed under an open-source license similar to the Apache, BSD, or MIT license).

Intel reserves the right to negotiate the final choice of agreement.

## POINT OF CONTACT FOR INQUIRIES AND SUBMISSIONS

Proposal submissions (and related inquiries) should be directed to: Mindy Murdock, HW/SW Curriculum Program Manager, University Research & Collaboration ([melinda.s.murdock@intel.com](mailto:melinda.s.murdock@intel.com)) and Dr. Anne Matsuura, Senior

Principal Engineer and Director of Quantum Applications and Architectures, Intel Labs ([anne.y.matsuura@intel.com](mailto:anne.y.matsuura@intel.com)).

This RFP is administered by the Intel Lab's University Research & Collaboration Office. Staff overseeing this program include Mindy Murdock and Scott Buck.