



Switch and Fabric Group (XFG) Department

Overview

Intel Connectivity Academy is proud to announce the formation of its XFG Department, dedicated to teaching courses covering the Tofino™ Family of Intelligent Fabric Processors (IFP).

The department offers world-class, instructor-led training courses, that cover a range of topics from introduction to basic concepts of data plane programming all the way to advanced P4 programming techniques. All courses include hands-on labs and are designed to be conducted either in-person or online.

The courses are organized into several **levels**, based on the required pre-requisites. The preparatory level is optional. The courses at the same level can be taken individually and independently from each other as needed to achieve specific educational goals.

The courses have different duration, measured in **units**. Each unit consists of 2 hours of lectures accompanied by hands-on lab work. When taught online, the course is split into multiple 1-unit sessions conducted over several days. When taught in-person, each day of training covers 2 units.

Goals

The main objective for all the courses is to provide robust, hands-on introduction to the relevant subject at the appropriate level of detail and difficulty that will allow the students to jumpstart their development process or continue it on a new level. The courses are designed to complement, rather than replace the official documentation.

The relevant concepts are introduced and explained, and then followed by carefully designed examples. The material is further reinforced through the specifically designed labs of various difficulty. To ensure the successful completion of labs, a preconfigured virtual machine and a dedicated online support channel is provided. Some advanced courses also include the labs to be performed on the real equipment.

What is included?

Depending on the training format, tuition includes the following:

	Online	In-Person
A ticket to one or more interactive, instructor-led lectures conducted online	✓	
A ticket to the in-person session at the specified training location		✓
High-quality printed materials and lab guides		✓
Breakfast, lunch, and mid-afternoon snack		✓
Lecture materials and lab guides in PDF format with lifetime updates	✓	✓
Access to a preconfigured, cloud-based virtual machine (as required by the course curriculum) for the duration of the course with an option to purchase additional time if needed	✓	✓
In-class support for the labs		✓
Online support for the labs via Slack (for the lab duration)	✓	✓

Course Catalog

Course Module Nomenclature

All courses use the 3-digit numbering (ICA-XFG-LCC) that is organized as follows:

L – The first character indicates course level:

- 0 – Preparatory
- 1 – Level 1
- 2 – Level 2
- 3 – Level 3
- 9 – Course Series

CC – The second and third digit indicate a specific course

- Specific numbers are assigned sequentially as courses or course series are published and do not indicate a specific order in which they should be taken

P4 Lab Codes

Depending on the course, different lab environment is being offered

- **n/a** – some preparatory level courses are theoretical in nature and no labs are required
- **VM** – all labs can be performed on the pre-configured, cloud-based virtual machine, provided by the Academy
 - VMs are accessible from anywhere using nothing but a standard web Browser (Mozilla, Chrome, Brave, Edge, Safari, Konqueror, etc.) with HTML5 support. No additional software installation is required
 - Students are encouraged to repeat the labs in their own environment (both on the VMs and on the real hardware systems). Some lab materials include additional instructions and advice to facilitate these experiments, but those are optional.
- **HWR** – Hardware Required. The labs require the students to have access to their own hardware system with the working version of P4 Studio SDE installed on it. No additional equipment is required
 - In the future, the systems may be provided by the Academy

Course List (subject to further revisions)

Please, see individual course module prospectuses for the detailed description of each of the courses. In case of a discrepancy, course prospectus controls.

Preparatory-level Courses

Course Code	Course Title	Units	Labs	NDA
ICA-XFG-001	Introduction to Data Plane Programmability	1	n/a	No
ICA-XFG-002	P4 ₁₆ Language Overview	1	n/a	No

Level 1 Courses

Course Code	Course Title	Units	Labs	NDA
ICA-XFG-101	Introduction to P4 ₁₆ , Intel® Tofino™ Family and Intel® P4 Studio SDE	6	VM	Yes

Level 2 Courses

Course Code	Course Title	Units	Labs	NDA
ICA-XFG-201	Advanced parsing and deparsing	2	VM	Yes
ICA-XFG-202	Counters and meters	1	VM	Yes
ICA-XFG-203	Action profiles, selectors and traffic distribution	2	VM	Yes
ICA-XFG-204	Multicast Basics	1	VM	Yes
ICA-XFG-205	Mirroring and Telemetry	2	VM	Yes
ICA-XFG-206	Recirculation and Multi-Pipe programming	1	VM	Yes
ICA-XFG-207	Stateful processing with registers	3	VM	Yes
ICA-XFG-208	Building a simple L2 data plane program	2	VM	Yes
ICA-XFG-209	Using Tofino Packet Generators	1	VM	Yes
ICA-XFG-210	Non-Linear Computations	1	VM	Yes
ICA-XFG-211	Packet Interfaces to the Control Plane	1	VM	Yes
ICA-XFG-220	Tofino Pipeline Architecture and Program Optimization	3	VM	Yes
ICA-XFG-221	Tofino Traffic Manager	3	HWR	Yes

Level 3 Course Modules

Course Code	Course Title	Units	Labs	NDA
ICA-XFG-301	Advanced P4 Program Optimization and Fitting	4	VM	Yes

Schedule

Class dates and times are announced on the [Academy Calendar Page](#) ahead of time and are subject to the specific demand.

Online classes are usually run in the morning or in the evening (Pacific Time) to accommodate students in various time zones. Individual units are usually being run on separate days, consecutive or with a day or two in between. It is recommended to use the time between the individual classes to do the labs.

In-person classes are typically run for the whole day, thereby accommodating two units of instruction. Lectures and labs are interleaved, and in-person support is provided by the instructor. Courses that require more than two units of instruction are run on consecutive days.

How to Register

Class dates and times are announced on the [Academy Calendar Page](#) ahead of time and you can register right on the site using the credit card or PayPal to pay for the tickets. The tickets can also be purchased via standard sales channels. Please, contact your Intel sales representative for more details.

Please, note that most courses require all the participants to have a valid NDA and SLA in place. Their existence will be verified after the purchase, and you will be notified if additional steps are required, or the ticket will be refunded.

Logistics

Online courses

To attend an online presentation, you will need to create a **free Zoom account, associated with your work email address**. Upon the registration, you will receive a link to the online event. You will also receive invitations to establish accounts on Slack and the [Academy Support Portal](#) for lab support and materials access, also **associated with your work email address**.

A high-speed internet connection is required to attend the online presentation. Call-in numbers for higher voice quality might be provided, depending on the region. Please, connect to the online meeting 5-10 minutes before the start to work out all potential connection problems.

All necessary materials, including the presentation PDFs and lab exercises will be available through the [Academy Support Portal](#) a day before the start of the class. We highly recommend that you print the presentation PDFs and use them to take notes. Alternatively, these presentations can be loaded on a tablet, where the notes can be taken with an electronic pen.

The information about the lab Virtual Machines will be provided at the end of the first lecture. VMs will be kept running throughout the duration of the course and shut down 48 hours after the end of the last class. Additional time can be purchased as a ticket add-on.

In-person courses

The location address and the arrival time can be found on the registration site and will be emailed to you as well. You are responsible for your own lodging and transportation; Academy staff will be happy to provide some recommendations.

You will receive invitations to establish accounts on Slack and the [Academy Support Portal](#) for lab support and materials access, also **associated with your work email address**.

All necessary materials will be printed for you and are yours to take notes and take them back home. You will also get a lifetime access to the updated versions of these materials on the Academy Support Portal.

The information about the lab Virtual Machines will be provided at the end of the lecture. VMs will be kept running throughout the duration of the course and shut down 48 hours after the end of the last class. Additional time can be purchased as a ticket add-on.

Contact

For more information, please contact connectivity.academy@intel.com.

Important Notes

Intel® P4 Studio SDE is a software product, developed independently from the software, available via p4.org. Some components of the SDE were contributed by Intel to p4.org, others rely on the code from p4.org, but the goals of the projects, the tools, and the workflows are different. P4.org software is a community-supported project with many resources freely available. This class covers Intel® P4 Studio SDE and **not** p4.org software. Specifically, not covered are the Behavioral Model (BMv2), v1model and PSA P4₁₆ architectures and neither is P4Runtime protocol.

P4₁₆ compiler for Intel® Tofino™ and Intel® Switch Runtime Interface APIs are in active development as is the course module material. While Intel® Connectivity Academy team strives to introduce Intel customers to the leading-edge software, bugs, errors and omissions may occur. The later versions of these course modules might significantly differ from the earlier ones.

The course module material covers both Tofino and Tofino2 devices. Relevant enhancements and differences are emphasized and discussed whenever applicable.

The availability of each course is announced separately. Please, visit [Intel® Connectivity Academy](#) website for more information.

The online presentations may be recorded and may be published, in whole or in part, in various media, including print, audio and video formats without further notice. If you do not want to participate, you may choose to either keep your audio and video connections muted or turned off or leave the call. By choosing to remain, you are consenting to the recording of the session.