Educational information systems and networks

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**0858-606, Summer 2019**

**Description:** From a foundation of computer networks and systems, this course expands to cover instructional technology infrastructure: file systems, users, wired and wireless networks, email, web servers, computer labs, and common educational software services. This course focuses on Free Software; where the source code is free to use, study, or modify. To explore these topics in this hands on class all students will be configuring their own Raspberry Pi computers and using them to complete a software/hardware project.

**Keywords:** linux, bash, systems, networks, lamp, free software, trouble shooting, technical project management, rasberry pi, physical computing, debian, ubuntu

# Goals & Objectives

This course introduces students to the key concepts in current networked computing in order to develop a conceptual framework for configuring and troubleshooting computing systems. Upon completing this course they will be able to:

* set up a secure, network computing environment
* effectively use the basic tools of GNU/Linux computing environments
* implement techniques for administering group and user permissions
* install and troubleshoot hardware and software infrastructure for networked and internet computing
* configure a client/user computer for specific purposes
* configure various server-side applications to support teaching and learning
* identify the ethical and legal concerns surrounding educational information systems

# Class Information

**Instructors:**

Tom Jennings [tjennings@adelphi.edu](mailto:tjennings@adelphi.edu)

Christian Correa [correa@adelphi.edu](mailto:correa@adelphi.edu)

**Class dates:**

Tuesday, May 28 - Monday, July 1

**Class meetings:**

Tuesday & Thursday, 5pm-8pm

Adelphi Swirbul Library, Gallagher Lab (2cnd floor)

# Course Communications

This is a *fully online course*. There is no set class time for video chat or live lectures. However, there will be two live lab sessions each week held by the instructors, using video conferencing, screen sharing, and other tools. You will be required to attend at least 4 of these sessions.

Participants in this course must actively participate in our suite of online communications tools, including Slack (<https://auedtech.slack.com>), Adelphi email, and the course website.

You *must* check your Adelphi email and the #raspberrypi channel on Slack **at least once a day.** It is highly recommended that you install the Slack mobile client and an email client on your mobile phone so that you receive “push notifications” of course announcements.

The best place to post general course questions and any content-related questions is the #raspberrypi Slack channel. The instructor and course assistant, as well as other students and alums monitor this channel and often provide immediate support. You are encouraged to contact the instructors at any time via email or direct message on Slack.

**Online tools:**

**Moodle:** will be used to post the syllabus and links to weekly readings, videos, and discussions.

**Slack:** will be our main channel for online communications. Please [Join our Slack team with your Adelphi email](https://auedtech.slack.com/signup). If you run into trouble or have a question, post it here to our channel, #raspberrypi, or send a message to @tomjennings. During the weeks of the class, we recommend running the Slack app for you phone.

**Trello:** is project management software that you will use to track/plan your two projects, and to share your progress with the course instructors. Create a [Trello Account](https://trello.com/signup) before the first week of class, and (optionally) [install the mobile app](https://trello.com/platforms).

**mail.adelphi.edu email:** we will use your official adelphi student email for class email communications as well as the associated google account for video/audio chats and calendar events. Please check this email regularly.

# Required Books

*None*

# Required Materials

## Desktop/Laptop

You must have access to a desktop computer running Linux, Windows, or MacOS to participate in this course. You will use this computer to participate in the course online and to configure and connect or your RPI. You can use a phone or tablet for some online elements of the course, however you will not be able to complete course assignments without access to a computer where you are able to install software.

In addition to the computer, you must have a webcam, headphones, and microphone to participate in live video chat and to record your screencasts.

## Raspberry Pi

Every student *must* purchase a Raspberry Pi (RPI) computer and accessories for use in this course. You will keep your own hardware.

The core setup **required** for all students (~$50):

* Raspberry Pi model 3 B+ [Buy on Ada Fruit](https://www.adafruit.com/product/3775)
* 16GB Micro SD Card (at least 2 recommended)

*You must have your RPI* ***before*** *the first week of class.*

In the spirit of Raspberry Pi and DIY, we encourage you to re-use any of these items that you might already have or might be able to buy second hand. You will need these items, but don’t need to buy them new. If you are unsure, you can wait until after the first class to make your purchase.

* USB Keyboard and Mouse
* Micro USB charger (you can use a phone charger)
* HDMI Cable
* Computer Monitor or TV with HDMI input (or you may need an HDMI to VGA adapter)
* USB Card reader for your MicroSD card

If you purchased everything except the monitor it would cost another $35-$50.

In addition to these core materials, you will also need to purchase/acquire materials to complete your final project (see below). Costs may range from $20-$80.

# Books & Resources

* [Raspberry Pi Foundation](https://www.raspberrypi.org/)
* [Ada Fruit](https://www.adafruit.com/)
* Crowley, C. 2017. [*Raspberry Pi: The Unofficial Tutorial*](http://cdn.makeuseof.com/wp-content/uploads/2017/07/Raspberry-Pi-The-Unofficial-Tutorial.pdf)
* [Make: Magazine](https://makezine.com/)
* [Explaining Computers Series](https://www.youtube.com/user/explainingcomputers/videos) (Youtube)

# Class sessions

|  |  |  |
| --- | --- | --- |
| Session | Date | Topic |
| 1 | Tue, May 28 | Computers & Operating Systems |
| 2 | Tue, Jun 4 | The Command Line |
| 3 | Tue, Jun 11 | Users, Groups, Files, & Permissions |
| 4 | Tue, Jun 18 | Networks |
| 5 | Tue, Jun 25 | Ethics |
| 6 | Mon, Jul 1 | Projects Due |

# Grades & Assignments

|  |  |  |
| --- | --- | --- |
| Assignment | Pct | Due |
| Participation | 20% | ongoing |
| RPI Client or Server Setup | 40% | 6/17 |
| Final RPI Project | 40% | 7/1 |

## Participation

Because this is a short summer course (3 credits in 6 weeks), you should budget 10-15 hours each week for course work. You must join at least 4 of the live lab sessions. During these labs, the course instructors will be available for help with projects and will demonstrate over video and screensharing some of the key techniques of the week. We recommend that you join at least one live lab each week. Your participation grade will consider your participation in class, timely management of your Trello projects, and participation in Slack and Moodle discussions.

## RPI Client or Server Setup

For our first project you will configure your Raspberry Pi for a specific educational scenario: a general computer for 4th grade classroom computer station, a setup to teach computer programming for kids, a development server for the Canvas LMS, a web server to host static HTML/Javascript projects, a managed computer lab setup, etc.

You will present your project as a narrated screencast. In addition to demonstrating the software, you will upload a report which details:

* a description of the target audience and how you envision they would use the RPI
* the process you used to find, test, and configure the RPI
* key features of the software installed
* advantages, disadvantages, and other implications of your design

You will be evaluated on:

* demonstration of your understanding of RPI hardware and software
* suitability of your solution for your stated audience/problem
* risk/complexity of the task undertaken
* reflection on the process

This is an individual project.

## DIY Project

One of the key technical tasks of an educational technologist or instructional designer is to research and evaluate possible solutions to a problem and then implement a plan to test a possible solution. Real world problems often require the combination of several systems in a new way, suffer from incomplete or inaccurate documentation, and are hindered by time or resources/financial constraints.

With this in mind, you will choose an RPI project that you find interesting and engaging to pursue for your final project. You will be responsible for gathering/purchasing the materials to complete the project.

You will be evaluated on:

* skill with RPI hardware
* skill with RPI software
* creativity of the project chosen
* risk/scope of the project
* reflection on the process

This is a *paired project.* You and a partner of your choice will work on the same project. You will share a Trello and set goals together, however you will both complete the project independently and will receive an individual grade. Your partner will serve as a resource for planning and troubleshooting problems that arise during the course of the project.

With the instructors’ permission, you may work on this project individually.

# Weekly Sessions

## Week 1: Computers & Operating Systems

This week we will learn about core computer hardware, and the key software (Operating Systems) that drive computers. We’ll also learn about the specific hardware of our RPIs and install an operating system so we can take them out for a test drive.

**Watch & Read:**

1. [Computer Hardware](https://www.youtube.com/watch?v=ExxFxD4OSZ0) (Computer parts Explained) [7:48]
2. [RPI Hardware](https://www.youtube.com/watch?v=SgR_5Ai64nM) (Urban Penguin) [2:01]
3. [*Unofficial Raspberry Pi Manual*](https://www.makeuseof.com/tag/great-things-small-package-your-unofficial-raspberry-pi-manual/) [(pdf)[http://cdn.makeuseof.com/wp-content/uploads/2017/07/Raspberry-Pi-The-Unofficial-Tutorial.pdf]] §1, §2, & §3
4. [What is an OS?](https://www.youtube.com/watch?v=26QPDBe-NB8) (Crash Course Computer Science) [13:35]
5. [What is Free Software?](https://www.fsf.org/about/what-is-free-software) (The Free Software Foundation)
6. Klint Finley. (April 24, 2019) [The WIRED Guide to Open Source Software](https://www.wired.com/story/wired-guide-open-source-software/). *WIRED*.

**To Do:**

1. Post in the “Introductions” forum on Moodle.
2. Install Raspbian on your RPI. [[instructions](https://www.raspberrypi.org/documentation/installation/installing-images/README.md)]
3. Make a case for your RPI and post a picture on Slack (see *Unofficial Manual* §3.1)

## Week 2: The Command Line

**Watch & Read:**

**To Do:**

## Week 3: Users, Groups, Files, & Permissions

**Watch & Read:**

**To Do:**

## Week 4: Networks

**Watch & Read:**

**To Do:**

## Week 5: Ethics

**Watch & Read:**

**To Do:**

## Week 6: Final Project Due