**BMB 417-S: NUTRITIONAL BIOCHEMISTRY**  
**Syllabus, AY 2016-2017 - Fall Semester**

**Lectures (LEC), Help Sessions (HELP), and Exams (EXAM):** Tu, Th 3:30pm-4:45pm, LC-130.  
**Coordinator/Instructor:** Thomas Harris, PhD

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
<th>Topic</th>
<th>Material</th>
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<tbody>
<tr>
<td><strong>PART 1</strong></td>
<td></td>
<td></td>
<td><strong>Nutrient Intake and Processing</strong></td>
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<tr>
<td>LEC 1.1</td>
<td>Aug 23</td>
<td>Tu</td>
<td>Digestion and Absorption</td>
<td>Slides + Video</td>
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<tr>
<td>LEC 1.2</td>
<td>Aug 25</td>
<td>Th</td>
<td>Glycolysis</td>
<td>Slides + Video</td>
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<tr>
<td>LEC 1.3</td>
<td>Aug 30</td>
<td>Tu</td>
<td>TCA Cycle, Ox-Phos, Shuttles</td>
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<td>LEC 1.4</td>
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<td>Th</td>
<td>Glycogen, Gluconeogenesis</td>
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<tr>
<td>LEC 1.5</td>
<td>Sep 06</td>
<td>Tu</td>
<td>Fatty Acids, TAG, Ketone Bodies</td>
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<tr>
<td>LEC 1.6</td>
<td>Sep 08</td>
<td>Th</td>
<td>Metabolic Fluctuation</td>
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<td>HELP 1</td>
<td>Sep 13</td>
<td>Tu</td>
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<td><strong>EXAM 1</strong></td>
<td>Sep 15</td>
<td>Th</td>
<td>Exam 1 (Part 1, 25 points)</td>
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<tr>
<td><strong>EXAM 1</strong></td>
<td>Sep 20</td>
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<td><strong>PART 2</strong></td>
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<td><strong>Enzyme Catalysis and Inhibition</strong></td>
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<td>LEC 2.1</td>
<td>Sep 22</td>
<td>Th</td>
<td>Data Analysis in OriginPro™</td>
<td>Slides + OriginPro-01 (3 pts)</td>
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<td>LEC 2.2</td>
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<td>Tu</td>
<td>Equilibrium Binding</td>
<td>Slides + OriginPro-02 (3 pts)</td>
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<td>LEC 2.3</td>
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<td>Th</td>
<td>Enzyme Activity</td>
<td>Slides + OriginPro-03 (3 pts)</td>
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<td>Tu</td>
<td>Steady State Kinetics</td>
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<td>Competitive Inhibition</td>
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<td>Tu</td>
<td>Noncompetitive Inhibition</td>
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<td><strong>EXAM 2</strong></td>
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<td><strong>FALL RECESS</strong></td>
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<td>LAST DAY TO DROP</td>
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<td>Tu</td>
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<td><strong>PART 3</strong></td>
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<td><strong>Metabolic Flux and Regulation</strong></td>
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<td>LEC 3.1</td>
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<td>Th</td>
<td>Mixed-Type Inhibition/Activation</td>
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<td>Tu</td>
<td>Multiple Substrates</td>
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<td>Nov 21-25</td>
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<td><strong>THANKSGIVING HOLIDAY</strong></td>
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<td>HELP 3</td>
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<td>Tu</td>
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<td>Th</td>
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<td><strong>NO FINAL EXAM (Happy Holidays!)</strong></td>
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BMB 417-S: NUTRITIONAL BIOCHEMISTRY
Syllabus, AY 2016-2017 - Fall Semester

WELCOME
Welcome to “Nutritional Biochemistry”. This course is divided into three parts. In Part 1, students will learn how (i) macronutrients (carbohydrates, protein, and lipids) and (ii) micronutrients (vitamins and minerals) are obtained in the diet, digested, absorbed, and processed. In addition to reviewing basic biochemical processes, these lectures will extend and better connect them to specific organ and tissue functions. In Part 2, students will learn to “formulate” mechanisms of enzyme catalysis and inhibition. In addition to deriving and understanding kinetic and binding equations, students will learn how to “plot and analyze enzyme kinetic and binding data”. In Part 3, enzyme data analysis will be extended to more complicated, but realistic scenarios. Then, these newly learned skills will be used to more rigorously examine metabolic flux control points, particularly related to regulation of enzymatic processing of glucose, pyruvate, acetyl CoA, and nitrogenous species. Students are expected to finish this course with thorough mechanistic understanding of (i) macronutrient composition, intake, and energy production and (ii) requirements of micronutrients in controlling enzyme-catalyzed reactions that produce energy. Student abilities to read and comprehend advanced research topics and applications in nutrition and health will be considerably enhanced.

INSTRUCTOR
Thomas Harris, PhD, Associate Professor
Director, BMB Undergraduate Studies and Medical Education
University of Miami, Miller School of Medicine (MEDICAL CAMPUS)
Department of Biochemistry and Molecular Biology; Gautier Building, Room 111
Phone: 305-243-3358; Email: tharris@miami.edu

TEXTBOOK / COMPUTER / SOFTWARE
No textbook is required. Rather, students are encouraged to utilize any available biochemistry textbooks and/or web resources to review these major metabolic pathways: (i) glycolysis and gluconeogenesis, (ii) glycogenesis and glycogenolysis, (iii) TCA cycle and oxidative phosphorylation, (iv) fatty acid synthesis and oxidation, and (v) amino acid degradation. For Parts 2 and 3, a notebook computer with Microsoft Windows is REQUIRED. A student license for downloading and installing the OriginPro™ data analysis program is provided (page 5). Also, instructions for installing Windows on Apple computers is provided (page 8).

GRADING
A total of 19 lectures (75 min each) will be covered, which will be assessed by three regular exams (75 min), with multiple-choice answers. Exams 1 (Part 1), 2 (Part 2), and 3 (Part 3) will each count 25 points for a total of 75 points, and they will cover material in lecture slides, as well as content from indicated web and board exercises. The remaining 27 points of the final grade will come from nine different in-class “OriginPro™” projects (3 points each), involving enzyme data plotting and analysis (Parts 2 and 3). Final letter grades will be assigned from the total score according to the following distribution: A+ (97.50-102.00); A (87.50-97.49); B+ (82.50–87.49); B (74.50-82.49); C+ (69.50-74.49); C (59.50–69.49); D (44.50–59.49); F (≤44.49). Minus grades will not be given. Grades of “Incomplete (I)” will be issued in cases only involving an accident or serious illness to a student that has good, passing scores in all previous exams.
EXAMS (READ CAREFULLY)
Instructions:
1. Enter the classroom and place your belongings against the wall, keeping with you only pencils and an eraser for the exam. No electronic devices of any type will be permitted during any of the exams. Proceed to the front desk, and you will be given both the exam and a score sheet for bubbling in your exam answers. Go to your assigned seat (page 4), bubble in your **name** and **C-number**, and you may begin answering exam questions. **Penalties will be imposed for failure to properly code your name or C-number.**

2. Before the end of the class period (4:45 pm), return BOTH the completed score sheet and the exam to the proctor at the front desk, displaying your photo ID (Cane-Card). If you do not hand in your materials in the specified time, the proctor will remove them from you. No extra time will be given to transfer answers from the exam booklet to the answer sheet. After you return the exam and score sheet, **leave the room quietly so as not to disturb students that have not finished.**

3. Once graded and finalized, scores will be posted on UM Blackboard. Scores for students whose identification information was not entered correctly cannot be posted. Such students may email the instructor to request their score. Both student and correct exam answers will be reviewed at the next class session.

Make-up Exams:
*All exams must be taken at the scheduled time.* Make-up exams will be allowed only in cases of a serious illness or hospitalization. In such cases, students must send an email notice to the instructor **before the exam**, and such instances should be confirmed afterwards by emailing a scanned copy of a document demonstrating medical attention and/or treatment procedures. Students unable to take an exam due to any school related activities should contact and discuss with the instructor **at least ten days** before test dates, certainly sooner if possible.

Office of Disability Services:
Please contact the Office of Disability Services to make arrangements for obtaining extra time for taking exams if needed due to a certified condition.

Religious Holidays:
During the **first week of the semester**, students should notify the instructor of their intention to take off for any religious holidays. If a religious holiday coincides with an exam, arrangements must be made to set an alternative date for the student's exam.

Honor Code:
All students are expected to abide by the Honor Code, and students should indicate that they have done so by marking this at the indicated place on each exam. Students should not receive or provide help from any source during exams. All students are obliged to report any irregularities that they witness to the instructors and to the Honor Council.
**ATTENDANCE**

For Part 1, class attendance is *not necessarily required*, since online videos are provided for each of these lectures. For PARTS 2 and 3, **CLASS ATTENDANCE WILL BE REQUIRED**! Here, nine different *OriginPro™* data analysis projects will be completed in class for points counting towards the final grade. For “Exams” and lecture dates where “*OriginPro™*” projects are indicated on the schedule, students must sit in their assigned seats (LC-130), according to the below seating chart. If you arrive late on these dates, make certain that I acknowledge you and record your attendance. For all other class dates, students may sit wherever they prefer.

**SEATING CHART (LC-130) - Exams / Excel Projects**

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First</th>
<th>Seat</th>
<th>Absent</th>
<th>Last Name</th>
<th>First</th>
<th>Seat</th>
<th>Absent</th>
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<td>Kimberly</td>
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<td>Levine</td>
<td>Harry</td>
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<td>Akram</td>
<td>Samah</td>
<td>B1</td>
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<td>Lin</td>
<td>Ji</td>
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<td>Khrystel</td>
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DATA ANALYSIS SOFTWARE
A student license for installing the OriginPro™ data analysis software will be provided. However, OriginPro™ can be installed on computers running ONLY Microsoft Windows. For students that own Apple notebook computers, instructions are provided, which will enable you to partition a section of your hard drive and install Windows 10, free of any charges (page 8).

1. Create OriginLab Account:
For students that already run a version of Windows, please go to this link to create your Origin Lab account:


Enter your first name, last name, E-mail address, and confirm E-mail address.
Company:* Enter “University of Miami”.
Department:* Enter “Biochemistry and Molecular Biology”.
Zip/Postal Code:* Enter 33136.
City:* Enter “Miami”.
Address 1:* Enter “1011 NW 15th St”.
Phone:* Enter “305-243-3358”.
Sector:* Select “Student”.
Discipline:* Select “Biochemistry”.

Leave the “E-mail Subscriptions” tick boxes unselected.

UserID:* Enter “UM email address”.
For (Confirm) Password:* Enter and Confirm your password.
Click “Join”.

Within minutes, you should receive a confirmation Email from “Customer-Care@OriginLab.com”.

2. OriginPro™ Download:
Once your Origin Lab account has been created, please go to this link to download your software: http://www.originlab.com/myorigin2016download

Enter UserID (UM email address)
Enter Password
Click “Log in”
At the bottom of the screen, you will see the file “Origin2016Sr2No_H.exe” begin downloading to your computer. After it finishes downloading, you have the choice to begin installation “Run”, open the folder where this file is contained “Open Folder”, or view the general downloads folder “View Downloads”. If you are ready to install the software, go ahead and click “Run”. If you want to install at a later time, simply close your browser window.
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3. OriginPro™ Installation:
If you did not click “Run” at the download, then simply double click on the downloaded file “Origin2016Sr2No_H.exe”, which should be in your “Downloads folder”. If your computer asks whether you will allow Origin to make changes to your computer, select “Yes”. Now, we are ready to proceed with Origin Setup.

a. Install Product or Evaluation?
   Select “Install Product (requires serial number)”
   Click “Next”.

b. Customer Information
   User Name: Enter “First and Last Name”, NOT email.
   Company Name: Enter “University of Miami”
   Serial Number: Enter GF3S4-6089-7611122 (VERY IMPORTANT!!!)
   Click “Next”.

c. Choose 32 bit, 64 bit, or both
   This should be automatically selected.
   Click “Next”.

d. License Requires Administrator
   Select “Yes, launch Origin as Administrator after installation finishes”.
   Click “Next”.

e. Destination Directory
   Confirm “C:\Program Files\OriginLab\Origin 2016”.
   Click “Next”.
   Then you will see “does not exist. Do you want Setup to create it?”
   Click “Yes”.

f. All users or current user?
   Select “All users”. (You must have “Administrator” privileges on your computer.)

g. Select Program Folder
   Program Folder: OriginLab\Origin 2016
   Click “Next”.

h. Start Copying Files
   Click “Next”.
   Allow setup to finish.

i. Setup Complete
   Click “Finish”.
   Origin Start Menu folder should open, displaying Origin Program Icon.
4. **OriginPro™ License Retrieval:** *Must have internet connection!*

In Windows “All apps”, click and open “OriginLab” folder; then click and open “Origin 2016” Program folder, indicated by the orange ball.

a. **Getting Started – Registering and Obtaining a License File**
   
   Select “Get a license file online now. This computer has internet access.”
   
   Click “OK”.
   
   A computer Information dialog opens with your computer details.
   
   Click “OK”.
   
   OriginLab website login will open.
   
   Enter UserID (UM email) and password.
   
   After login,
   
   Enter “**Access Code:**” **116114** *(VERY IMPORTANT!!!)*

b. License will be generated and displayed in box on OriginLab web page.
   
   Copy “license text”

c. Go to your opened Origin Program.
   
   Paste “license text” into the “Enter License” dialog box.
   
   Click “OK”.

If you need additional help, the full detailed instructions are provided in these links:

**OriginPro™ Installation:**


**OriginPro™ License Retrieval:**


**OriginPro™ Video Tutorials:**

APPLE COMPUTERS – How to Install Windows using Boot Camp

Apple provides a very convenient system for partitioning the hard drive and installing a Windows operating system, which is called “Boot Camp Assistant”. This will allow you to operate your computer, using either (i) Apple OS X or (ii) MS Windows. Before we begin “Boot Camp Assistant”, you must first download a Windows ISO image of the full-install, 64-bit version of Windows 10.

Download ISO Image of Windows 10:

Go to University of Miami, Information Technology web site:  http://it.miami.edu

*Click* on “Services & Products”

Scroll down to “Software”

*Click* on “Learn More>”

Scroll down and

*Click* on “Microsoft Windows”

Scroll down to “Students:” and

*Click* on “Click here to download Microsoft Windows”

*Click* on “Sign In” (upper right corner)

*Click* on “Click here once you have signed in.” (center page)

*Click* on “Education Windows 10”

*Click* on “Add to Cart”

CHECK OUT.

You will receive email confirmation with your order details. Anytime, you may go to this email and get back to this WebStore.

In the WebStore,

*Click* on the item you “purchased” for free

“Windows 10 Education (Multilanguage) (Student) – Download”

On next page,

*Click* on “View Details”

IMPORTANT!

a. Under “Items” blue title bar,

   WRITE DOWN your “PRODUCT KEY (RED COLOR)”

b. In “Items” title bar, *Click* “Download”

c. Under “Download Your Software” blue title bar,

   *Click* “Download”, which will take you to a pdf with instructions.

IMPORTANT!

d. Scroll down to “Windows XP and Windows Vista users”

   *Click* on “Microsoft’s ISO Software Download Site”

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e. Scroll down to “Follow these steps to download your product”  
Enter your “PRODUCT KEY”  
Click “Verify” and wait for next page.

f. Select product language “English”  
Click “Confirm” and wait for next page.

g. Select “64-bit Download”  
Click “Save File”  
Be patient, this ~4 GB file: “Win10_1607_Education_English_x64.iso”  
takes ~20-30 minutes to download into your “Downloads” folder.  
Close “Microsoft Download Academic Products” window, previous browser windows, and  
Exit your browser.

Before you begin:  
a. Plug In your MacBook(Pro) to power source.

b. Backup all important documents and work!

c. Check OS X is El Capitan version 10.11.6 (15G31)  
(Apple > About this Mac), under OS X El Capitan, Click “version”.  
Write down version and (build number).  
If not, then proceed: App Store > Updates.

d. Format USB Flash Drive  
Insert USB Flash Drive (≥8 GB) into Mac  
Launchpad > Disk Utility > Erase  
Enter name: “Boot Camp”  
Select format “MS-DOS (FAT)”  
Click “Erase”  

Now, you should have the “Win10_1607_Education_English_x64.iso” file in your “Downloads” folder; and your formatted USB Flash Drive (≥8 GB) inserted into your MacBook(Pro).  
Proceed to “Boot Camp Assistant” (see next page).
Boot Camp Assistant:
Launch Pad > Other > Boot Camp Assistant

Click “Continue”

a.  (selected) Create Windows 7 or higher install disk
   (selected) Install Windows 7 or higher
   Click “Continue”

b.  ISO image:
   Choose: “Win10_1607_Education_English_x64.iso” from “Downloads” folder

   Destination Disk:
   USB Flash Drive “BOOT CAMP” should be indicated.

   Click “Continue” (Do not worry about warning. You already formatted your flash drive.)
   Click “Continue”!

Now, Boot Camp Assistant will convert and transfer the “ISO” file contents to become a
“Windows Installation” file, named “WININSTALL” on your flash drive.

c.  Task Status:
   Be patient, this takes ~40 minutes to process.
   “Formatting selected drive”
   “Copying Windows files”
   “Downloading Windows support software”
   “Saving Windows support software”
   After this last task, a window appears: “Boot Camp would like to add a new helper tool.”
   Enter your MacBook(Pro) administrator password.
   Click “Add Helper”

d.  Create a Windows Partition:
   Specify a partition size by dragging the divider between the OS X and Windows partitions.
   Note: Must select at least 30 GB for Windows with OriginPro and other uses.
   Think carefully, since you cannot resize the partition.
   Although, you can remove Windows and reinstall.
   Click “Install”

e.  Status:
   Partitioning disk...
   Black screen
   Windows symbol appears
   “Setup is starting”
f. Windows Setup:
   Language “English (US)”
   Time “English (US)”
   Keyboard “US”
   *Click “Next”*

g. Activate Windows:
   *Enter “Product Key”*
   *Click “Next”*

h. Select the operating system you want to install:
   *Confirm “Windows 10 Education x64”*
   *Click “Next”*

i. Applicable notices and licensing terms:
   *Tick “I accept”*
   *Click “Next”*

j. Where do you want to install Windows?
   *Select/Click “Drive 0 Partition 4: BOOTCAMP”*
   *Click “Format”*
   Warning – *Click “OK” and wait…*  
   *Click “Next”*

k. Installing Windows: **takes ~7 minutes**
   Status
   Copying Windows files
   Getting files ready for installation
   Installing features
   Installing updates
   Finishing up

l. Windows 10 initiation: **takes ~2 minutes**

m. Get going fast:
   *Select “Customize”*

   Customize settings – Personalization
   *Switch all setting from “Yes” to “No”*
   *Click “Next”*

   Customize settings – Connectivity and error reporting
   *Switch all setting from “Yes” to “No”*
   *Click “Next”*
Customize settings – Browser protection and update
Switch all setting from “Yes” to “No”
Click “Next”
“Just a moment…”

n. Choose how you’ll connect:
Ignore “Join Azure Active Directory (Office 365)”
Click “Join a local Active Directory domain (set later in settings)”

o. Create an account for this PC:
Enter “User Name” and “Password”
Re-Enter “Password”
Enter “Password Hint”
“Just a moment…” black screen...
“Hi” “We’re happy you’re here”
Blue screen fading between dim and bright,
“Getting things ready, please don’t turn off your PC.”

p. Welcome to the Boot Camp Installer (Version 6.0 (Build version 6136)):
Click “Next”
Select “I accept the terms in this agreement.”
Click “Install”
“Installing Boot Camp – Please Wait”
Status:
Enumerating pre-install packages
Computing space requirement
Downloading of many Apple devices, etc, etc
Installer completed
Click “Finish”
“You must restart for configuration changes to be made…”
Click “Yes”
Restarts with blue screen, black screen (1 min), then arrive at Beach/Cave photo with time & date in lower left corner.
Hit any key “begin”
Enter “Password”
“Welcome”

Congratulations! You installed Windows on your MacBook(Pro)!

Most likely, you will be asked to enter CaneID and password to connect to SecureCanes Wi-Fi. If not, see next page for setting up your Wi-Fi internet connection with SecureCanes, which is necessary for you to download and install the OriginPro™ software.
Microsoft Windows 10:

a. Account Settings
   Click “Windows Symbol” in lower left corner
   Click “Settings”
   Click “Accounts”
   At top, you should see –
   “Your User Name”
   “Local Account”
   “Administrator”
   Make sure there are no red warnings!
   Click “Arrow” (upper left corner) to go back to Settings.

b. Internet Settings
   Click “Network and Internet”
   Select “SecureCanes”
   Click “Connect”
   Enter “CaneID” and “Password”
   Click “X” (upper right corner) to close Settings.

Wi-Fi connection can also be adjusted from Wi-Fi icon in lower right corner of desktop.