



Software Tools for BME 4900

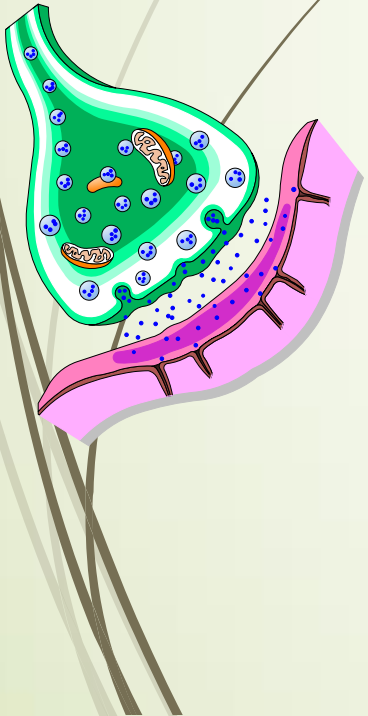


Software Demonstrations

- ▶ MatLab Simulink for Modeling and simulation
- ▶ Multisim for Electric Circuits
- ▶ Microchip Filters for Filters
- ▶ Dreamweaver for Websites
- ▶ vPC for connecting to a virtual PC that runs most of our software
- ▶ CAD

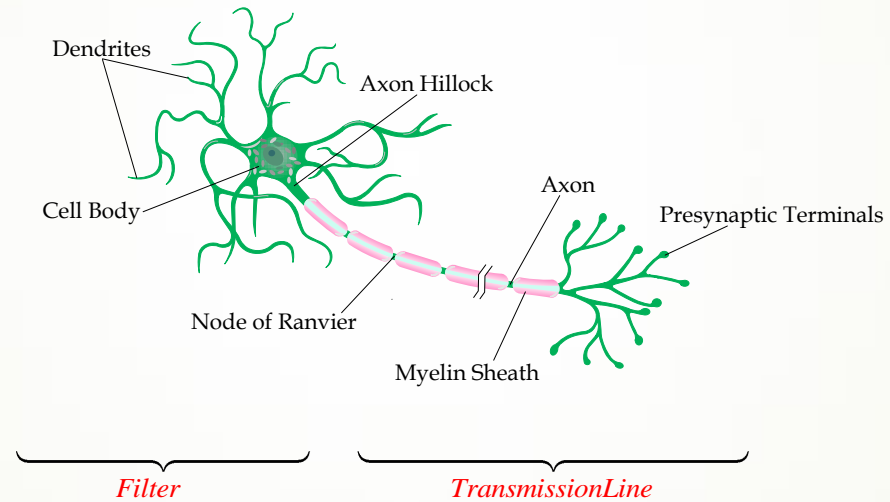
Dendrite Example for a Neuron

- ▶ There are approx. 10^{12} nerve cells that can be classified into about 1000 different types
- ▶ The complex abilities of the brain are not a function of the individual differences among nerve cells, but by virtue of their connections to the periphery
- ▶ Synaptic potentials are the means whereby one neuron can change the membrane potential of another neuron to which it is connected
- ▶ The presynaptic neuron releases a chemical transmitter that interacts with receptor molecules. This potential is a transformation of chemical energy into electrical energy.
- ▶ Chemical transmitter travel across the gap and being absorbed into the cell membrane and then into the cytoplasm



Cell Body, Axon, Dendrite and Presynaptic Terminal

➤ Sketch of a neuron

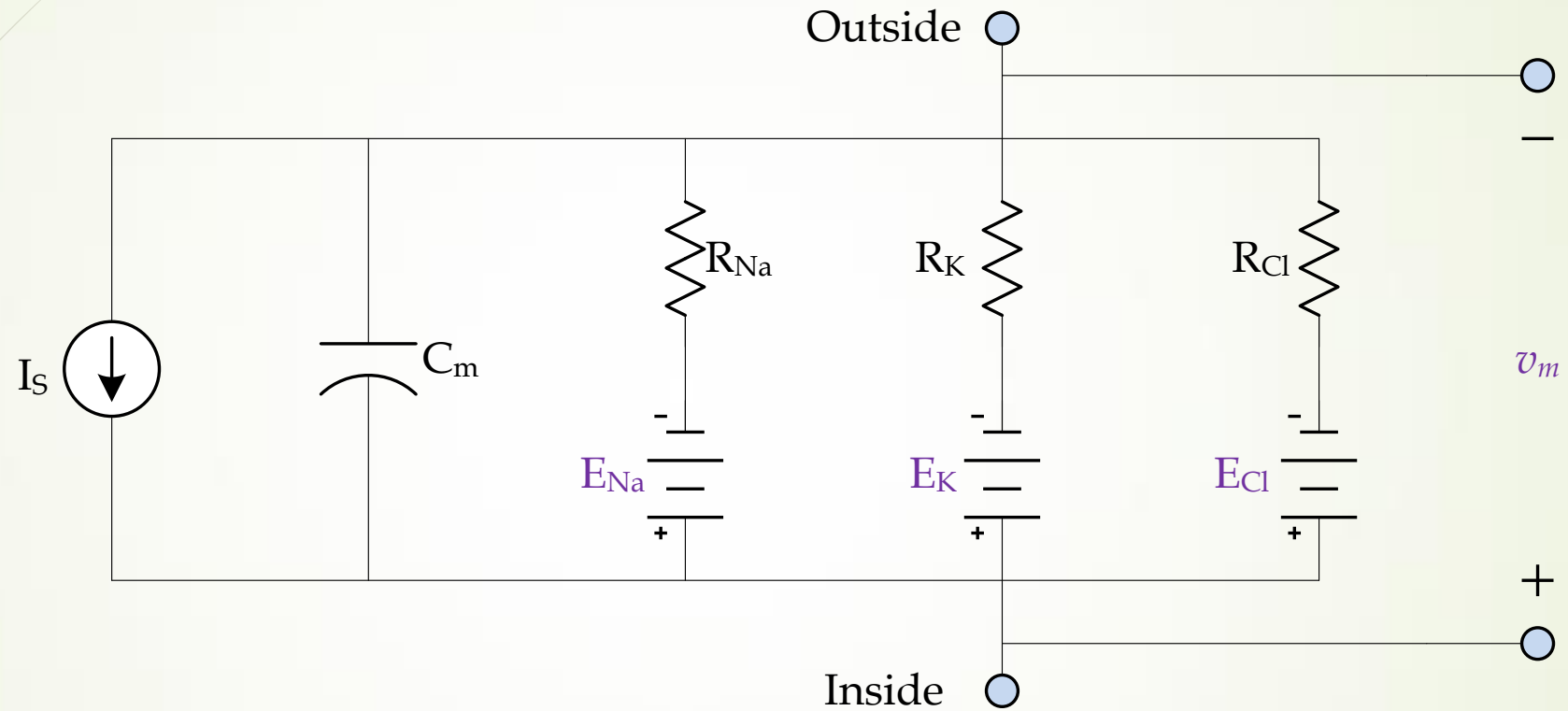




Equivalent Circuit Model

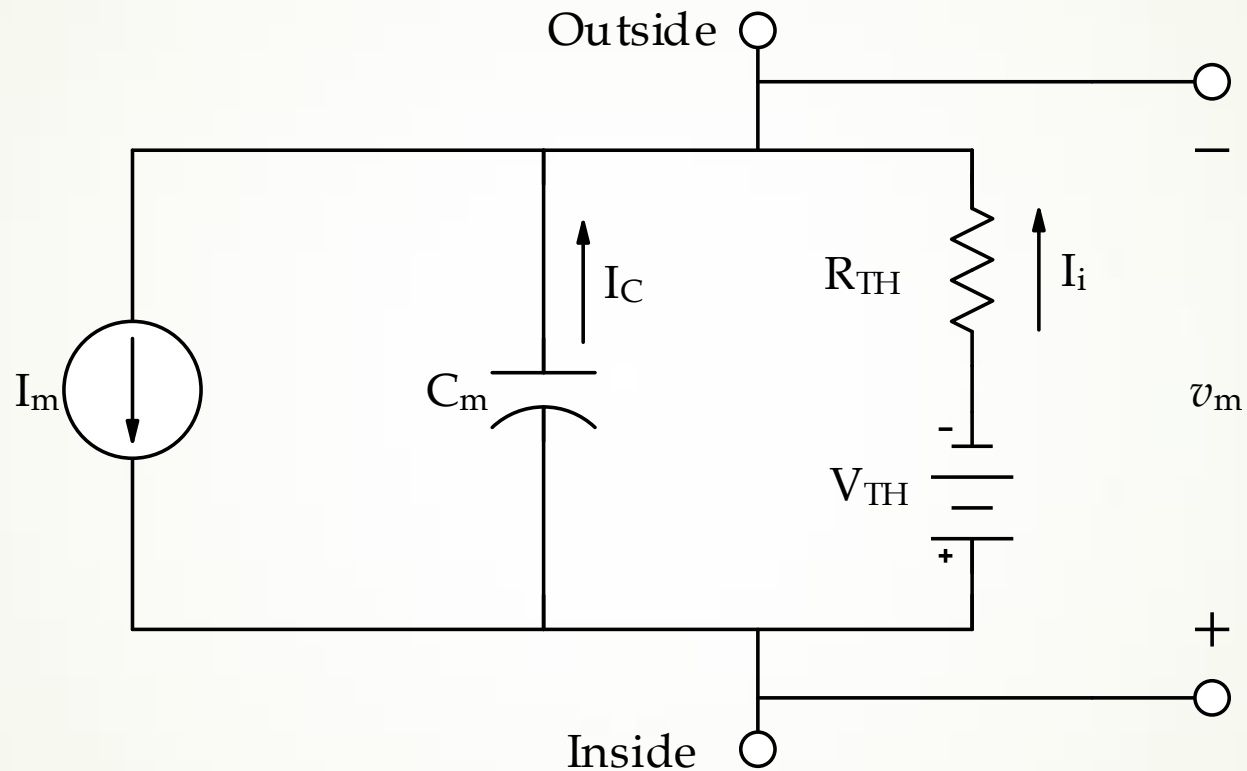
- The nerve cell has 3 types of passive electrical characteristics: electromotive force, resistance, and capacitance.
- Each channel is characterized as being passive (always open) or active (gates that can be opened).
- Each ionic channel is also characterized by its selectivity. It will normally selectively filter all ions except one.

Dendrite Circuit Model



$$\frac{v_m - E_{Na}}{R_{Na}} + \frac{v_m - E_K}{R_K} + \frac{v_m - E_{Cl}}{R_{Cl}} + C_m \frac{dv_m}{dt} = I_s$$

Simplification



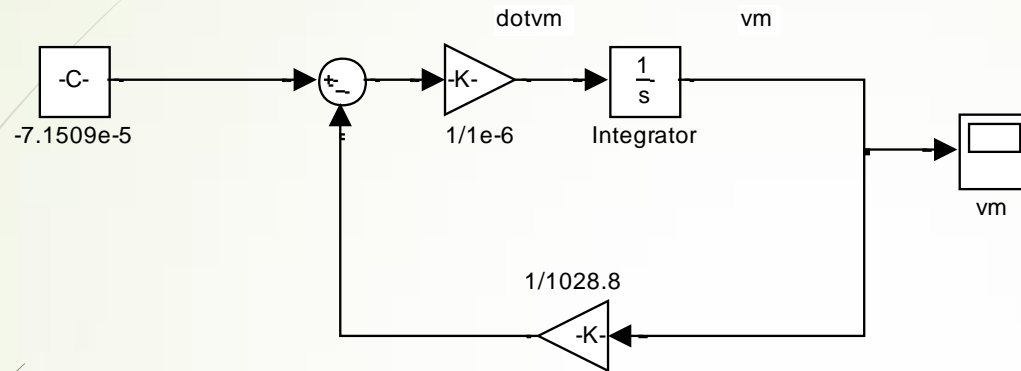
$E_K = -105 \text{ mV}$, $E_{Na} = 56 \text{ mV}$, $E_{Cl} = -89 \text{ mV}$, $R_K = 1.7 \text{ k}\Omega$, $R_{Na} = 15.67 \text{ k}\Omega$ and $R_{Cl} = 3.125 \text{ k}\Omega$, $C_m = 1 \text{ }\mu\text{F}$ and $I_s = 15 \text{ }\mu\text{A}$.

$R_{TH} = 1.0288 \text{ k}\Omega$

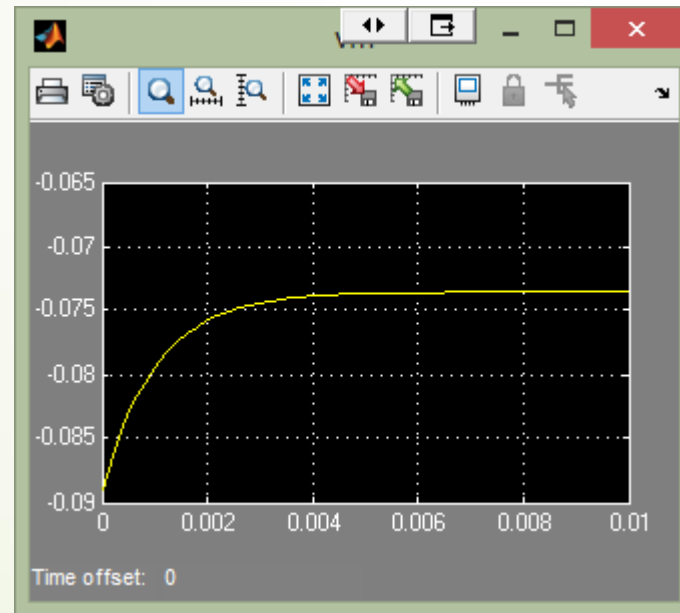
$V_{TH} = -0.089 \text{ V}$

$$\frac{v_m - V_{TH}}{R_{TH}} + C_m \frac{dv_m}{dt} = I_s \text{ or } \frac{v_m + 0.089}{1028.8} + 1 \times 10^{-6} \times \frac{dv_m}{dt} = 15 \times 10^{-6}$$

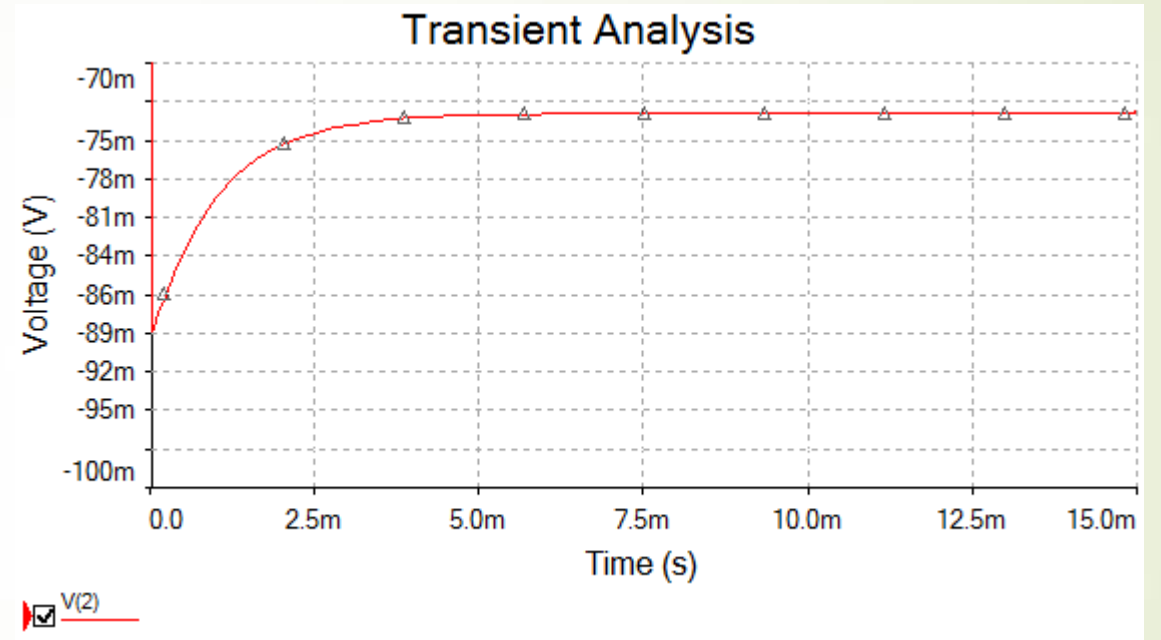
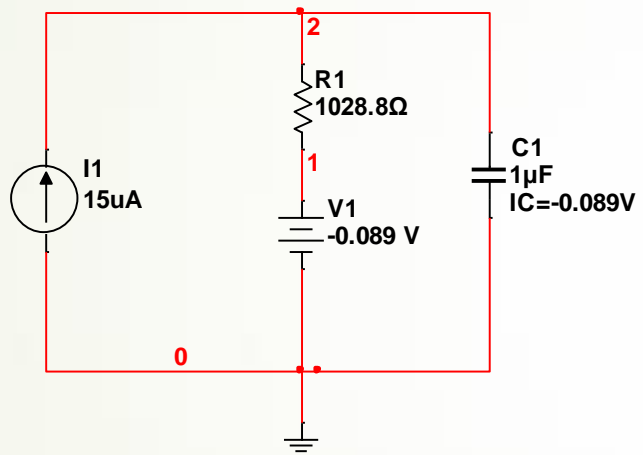
MatLab Simulink



$$\dot{v}_m = \frac{1}{1 \times 10^{-6}} \left(\frac{-v_m}{1028.8} - \frac{0.089}{1028.8} + 15 \times 10^{-6} \right)$$
$$= \frac{1}{1 \times 10^{-6}} \left(\frac{-v_m}{1028.8} - \right)$$

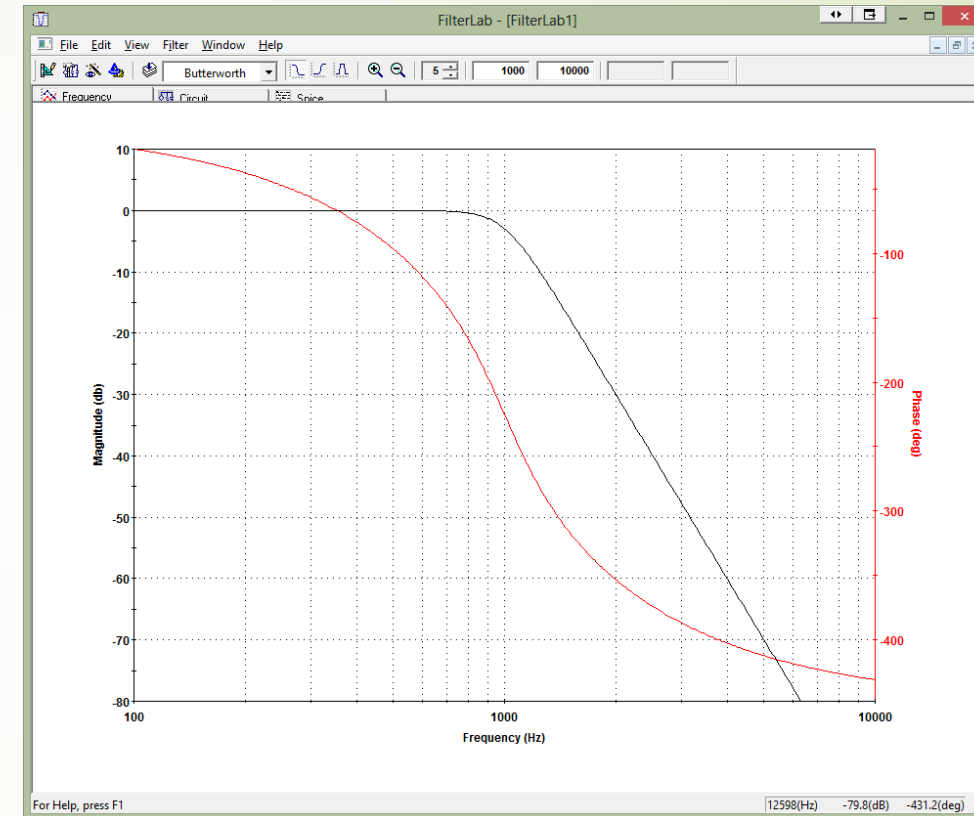
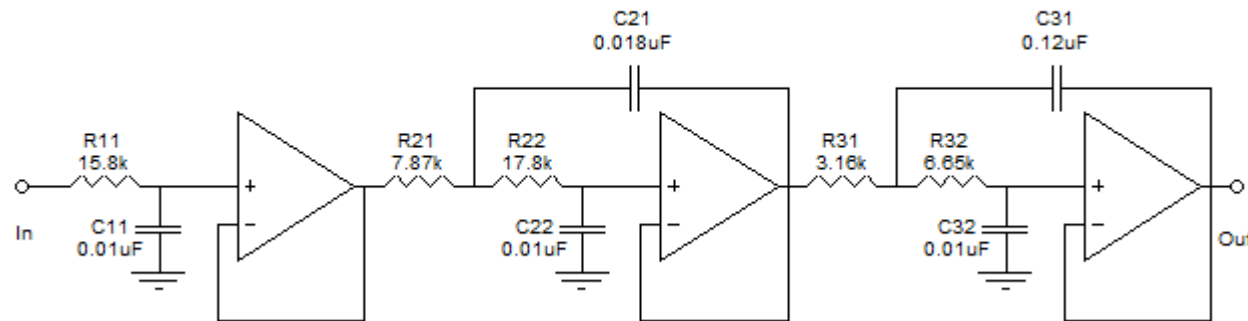


Multisim Circuit



Microchip Filters Program

- On Website Handouts Section-Filters Lab
- Allow you to design filters to meet specifications such as bandwidth, Pass band to Stop band, etc.
- Provides a circuit, plus Spice Code





Dreamweaver

- ▶ See <http://www.bme.uconn.edu/sendes/webmanagement/webmanagement.html>
- ▶ **Before getting started with Dreamweaver, we need to set up your website webpage using a mapped drive.**
 - ▶ **If you are using Windows from on-campus, and you are the editor for the website <http://www.bme.uconn.edu/sendes/Spring13/Team2> is `\\files.engr.uconn.edu\dept_web\www.bme.uconn.edu\sendes\Spring13\Team2\`.**
- ▶ You may want to use different options if you are on-campus or off-campus. If you are more comfortable with on-campus options, you can always use them through the [UITS VPN](#).

vPC (Virtual PC)

➔ <http://vpc.uconn.edu/>



The screenshot shows the homepage of the UConn vPC service. The header features the University of Connecticut logo and the text "UConn vPC". A search bar is located in the top right corner. Below the header is a navigation menu with links for "Home", "Help Center", "Blog", and "About". The main content area is divided into two columns. The left column contains the heading "UConn vPC" with the tagline "Your computer lab. Anywhere. Anytime." and a sub-heading "Access vPC from your iPad or Android device." The right column features a "VMware View" logo and the text "Experience the new vPC" with a "Click here to start" link. Below this is a "Get immediate access to vPC Lite" button with a note "Works in: Chrome and Safari". The bottom section is split into two columns: "What is UConn vPC?" and "How do I use it?". The "What is UConn vPC?" section includes two paragraphs of text. The "How do I use it?" section includes three links: "Visit our Help Center.", "New to vPC! Store your files on the P: Drive.", and "Need more help? Visit HuskyTech.". The footer contains links for "UConn Home", "Contact Us", and "Disclaimers, Privacy & Copyright".

University of Connecticut UConn vPC

UConn vPC
Your computer lab. Anywhere. Anytime.

Access vPC from your iPad or Android device.

VMware View Experience the new vPC
Click here to start

Get immediate access to vPC Lite
Works in: Chrome and Safari

What is UConn vPC?

UConn vPC is a virtual computer lab that allows you to use UConn Software and Resources from anywhere in the world (including your PC, Mac or iPad)!

UConn vPC is a collaboration between the School of Business, the School of Engineering, and the University Libraries.

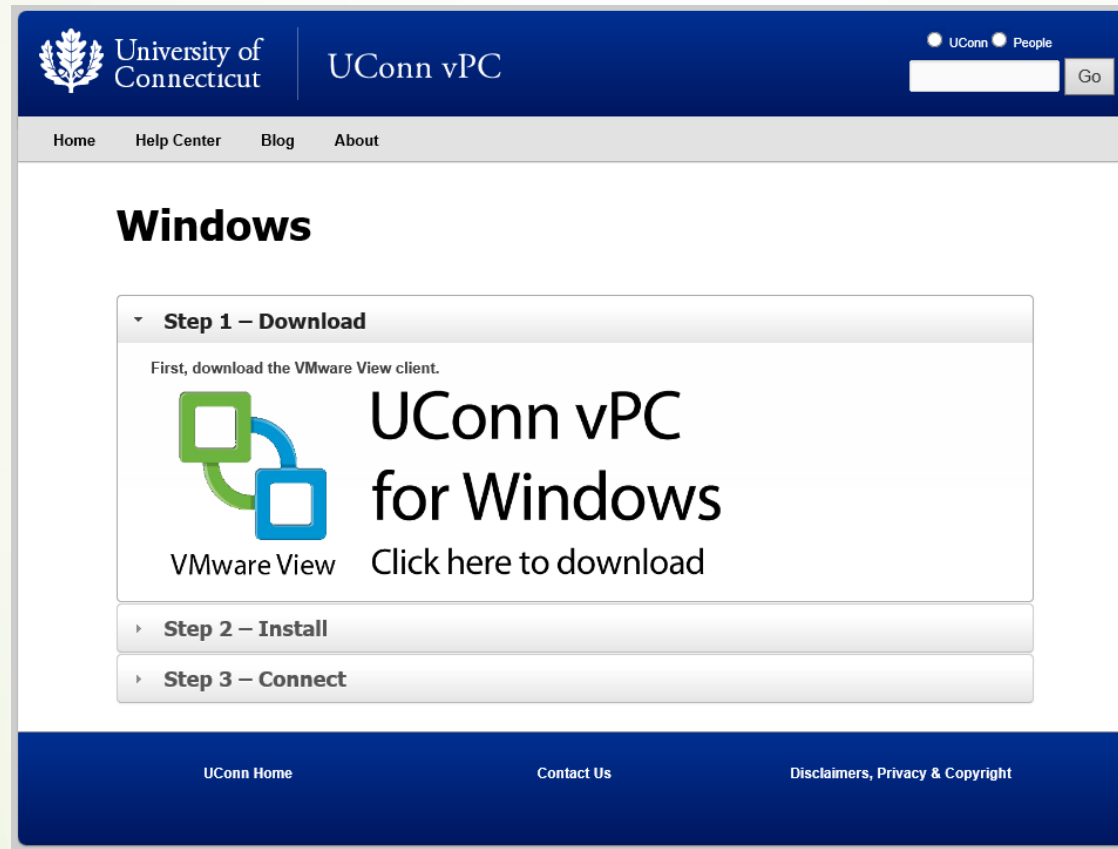
How do I use it?

[Visit our Help Center.](#)
[View available software.](#)
[New to vPC! Store your files on the P: Drive.](#)

Need more help?
[Visit HuskyTech.](#)

UConn Home Contact Us Disclaimers, Privacy & Copyright

vPC



The screenshot shows the UConn vPC website interface. At the top left is the University of Connecticut logo. To its right is the text "UConn vPC". Further right is a search bar with "UConn" and "People" radio buttons and a "Go" button. Below the header is a navigation menu with "Home", "Help Center", "Blog", and "About". The main content area is titled "Windows" and features a "Step 1 - Download" section. This section includes the instruction "First, download the VMware View client." and a graphic with the VMware View logo (two overlapping squares, one green and one blue) and the text "UConn vPC for Windows". Below the graphic is a "Click here to download" link. Below the download section are two more steps: "Step 2 - Install" and "Step 3 - Connect". The footer contains "UConn Home", "Contact Us", and "Disclaimers, Privacy & Copyright".

University of Connecticut

UConn vPC

UConn People


Go

Home Help Center Blog About

Windows

▼ **Step 1 – Download**

First, download the VMware View client.



UConn vPC
for Windows

Click here to download

▶ **Step 2 – Install**

▶ **Step 3 – Connect**

UConn Home Contact Us Disclaimers, Privacy & Copyright

Windows

Step 1 – Download

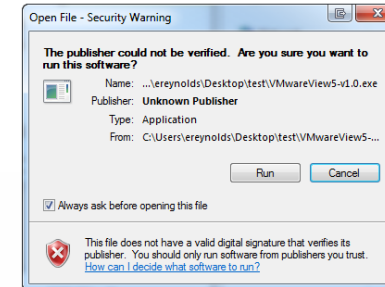
Step 2 – Install

Follow these simple steps to install the VMware View client.

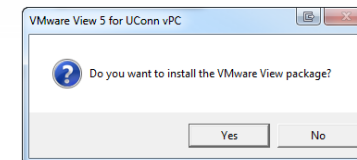
Double-click on the "VMwareView5-v1.0.exe" file you downloaded in Step 1.

Name	Date modified	Type	Size
VMwareView5-v1.0.exe	1/16/2012 10:51 AM	Application	46,950 KB

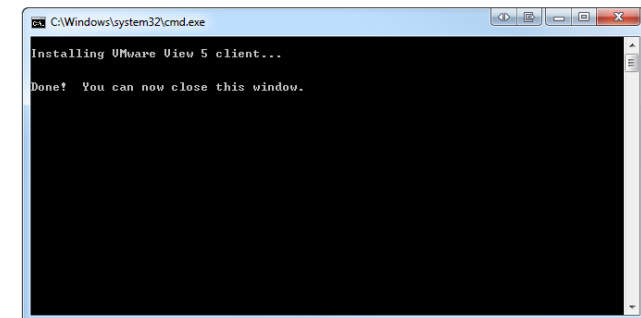
Click Run if you are prompted with an "Open File – Security Warning" window.



Click Yes to install.



Wait a minute or two while the client installs. You can close the black window when it is finished.



Step 3 – Connect

vPC