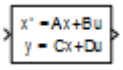
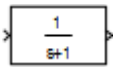
Common Simulink Components

For most of the systems we will encounter, we only need to be concerned with a small fraction of Simulink's component library. For further details, just double-click on any block. In particular, you should get familiar with the following components, grouped by Library:

Continuous:

	Derivative	Numerical derivative of a signal
	Integrator	Continuous-time integration of a signal.
	State-Space	Add a system block in state-space form.
	Transfer Fcn	Add a system block in transfer function form.

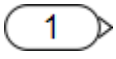
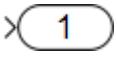
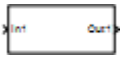
Discontinuous:

	Saturation	Limit input signal to specified upper and lower saturation values.

Math Operations:

	Abs	Absolute value.
	Gain	Constant gain. By double-clicking and changing the multiplication type to "Matrix(K*u)", can do matrix multiplication.
	Math Function	Math functions such as exp, log, ln, sqrt, square, pow, etc. Double-click and see Function drop-down menu for complete list.
	Sum	Add/subtract two or more signals. Double-click and modify List of Signs to change signs or add/remove input nodes.
	Trigonometric Function	Used to place non-linear trig elements such as sin, cos, tan, and their inverses.

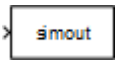
Ports & Subsystems:

	In1	Add an input to a subsystem.
	Out1	Add an output to a subsystem.
	Subsystem	Create a user-defined subsystem with variable number of inputs and outputs. Double-click block to view/edit the subsystem.

Signal Routing:

	Demux	Used to split up a bus of multiple signals into its individual signals.
	Mux	Used to combine multiple signals into a single bus.
	Switch	You can think of this as a mux. 2nd input is compared against threshold and passes either 1st input or 3rd input based on value.

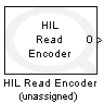
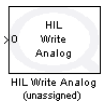
Sinks:

	Scope	Used to view system signals DURING simulation. Can plot more than one signal at once (connect bus to input).
	To Workspace	Stores signal into MATLAB workspace as specified Variable Name, where you can plot or process it as you wish. Make sure to double-click and change Save Format to "Array".

Sources:

	Clock	Clock signal returns time values used in simulation.
	Constant	Constant.
	Pulse Generator	Periodic pulse signal with specified amplitude, period, duty cycle, and phase delay.
	Ramp	Ramp signal with specified slope and start time.
	Sine Wave	Sinusoid with specified amplitude, bias, frequency, and phase.
	Step	Step signal with specified initial and final values and step time.

Quanser: (find these in QuaRC Targets → Data Acquisition → Generic)

	HIL Initialize	Found under "Configuration." Initialization block must be present in Simulink diagram to work on hardware. Make sure Board Type is set to "q4" or "usb2" as appropriate for your hardware station.
	HIL Read Encoder	Found under "Immediate I/O." Read quadrature encoder inputs. Double-click and change Input Port to vector `[0 1]` to read multiple inputs. Make sure target is not "unassigned."
	HIL Write Analog	Found under "Immediate I/O." Write voltage signal to analog output. Make sure target is not "unassigned."