1 Introduction

The assessment committee is responsible for gathering information regarding the undergraduate curriculum and teaching in the Electrical and Computer Engineering Department. Formal sources of assessment information include:

- The Industrial Advisory Committee
- Alumni surveys
- Senior exit interviews
- Faculty course assessments
- ABET outcome forms for criterion (a)–(k)

2 IAC Input

The major IAC input this year was in formulating the new department objectives. We met in both the fall and spring meetings to discuss these, making modifications after fall and presenting them for further input in the spring. The current objectives are:

The educational objectives of the Electrical Engineering and Computer Engineering Programs at Utah State University are as follows.

To provide students with:

1. Education in the fundamental sciences and mathematics that underlie engineering with a general breadth and depth in engineering analysis and design;
2. Awareness of current technology and the fundamental background to be able to stay informed and adept at new technologies;
3. The ability to put ideas into practice through effective analysis, problem solving, requirements development, design, and implementation;
4. A broad awareness of the world around them through general education so they are prepared to achieve their potential and make contributions in their professional and personal lives;
5. The foundation of communications and teamwork skills and professional attitudes and ethics.

3 Results from Alumni Survey

The alumni survey for 2005 it in appendix A. We have mapped the questions on the survey to the objectives used in 2005 (these are summarized on the Alumni Survey Forms). The mapping is as follows:

EE Objectives
- Contribute to engineering practice. Survey questions: 4, 5, 8, 5, 12, 13, 14, 15, 16
- Advancing their education. Survey questions: 9
- Leadership role: Survey Questions: 10, 13, 15, 16

CompEng Objectives
- Apply fundamental principles to solve eng. problems. Survey questions: 4, 6, 8, 11
- Engaged in ... development. Survey questions: 6, 8, 9, 10, 11, 13, 14, 15, 16
- Implementing well-planned ... designs. Survey questions: 6, 8, 11
Function as team members. Survey questions: 12, 13, 14

Summary of survey results. Tabulated results indicate number of outcomes from question rubric (1 = no/never/not at all, 5 = yes/always).

Number of surveys requested   36
Number of surveys returned  10
Year of graduates  2002

Working in EE or CompE professional area: 9. (tenth one appears to be in graduate school, and indicates that the engineering education has helped them arrive at their current position).

Have the technical courses at USU equipped you with fundamentals:

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How do technical aspects compare with peers?

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Professional development/education activities

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<th>grad. school</th>
<th>in-house</th>
<th>tech. conf.</th>
<th>tech. reading</th>
<th>prof. collab.</th>
<th>other</th>
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<td>6</td>
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<td>5</td>
<td>1</td>
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All students except one participated in post-graduate professional development and educational activizes, and most participated in more than one.

Do you consider yourself a leader in your field/community:

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To what extent has USU prepared you with skills and tools:

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To what extent has USU prepared you to function as a contributing team member?

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To what extent has USU prepared you for interaction with other people in your professional life:

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To what extent has USU provided you with written and verbal communication skills?

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Suggestions: More written projects, presentations, etc. Have a technical writing class before senior project
Technical writing course

What is the extent to which USU has helped you make contributions to your profession and society?

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To what extent are you involved in community or professional service?

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**Suggested improvements:**
- more business
- more applied engineering: math/physics/programming applied to problem solving
- more math
- more EM
- more electronics
- more electronics
- more electronics
- program accountability/presentations
- more digital
- power
- instrumentation data data acquisition
- device physics
- more digital
- more programming (from an EE)
- more semiconductor

**What they liked:**
- Hands on labs
- faculty
- digital design, computer interface & projects
- camaraderie with other engineers
- concurrent programming series
- helpful teachers, a feeling of community that allowed for great study groups
- class projects
- approachable instructors
- caliber of students attracted to program
- quaintness
- great professors

**What to change:**
- better organized curriculum with continuity and consistency
- MS for computer engineers
- more offerings in semiconductor design and physics
- interaction with real-world companies (internships, co-ops, etc.)
- undergraduate research experience
- better advising
- stronger focus on teaching
- more consistent class scheduling
- confidence in the education we’re receiving
- add tools courses e.g., LabView, Xilinx, Mentor graphics, ...
- to have had the imaging lab there when I was there
- more labs

### 3.1 Discussion on Alumni Survey

In reviewing these responses, almost all are at the 3 score “average” or better, with only a couple of exceptions. In all cases, the scores are above “average.” All of the respondents except 1 have been involved with education beyond their bachelors degree, and most of those have been involved in more than one type of educational activity. Based on these responses, we would conclude that the objectives have been achieved.
However, there are things that can be learned from the weaker responses. For the professional development/education activities: the respondent who has done “none” is currently employed as an engineer, placing him in a vulnerable position. Such a static position can be easily replaced. Some effort needs to be used to encourage greater educational efforts by all students.

In the weaker category, we have a student who felt less than average equipped with fundamentals. This is, by the way, the same student who has had no additional professional development. To provide some perspective on the student from the survey, this is an ECE student who wanted more digital and more programming experience, and rates USU only weakly compared with peers. It is difficult to put to much emphasis on this negative student, who did not even seem to go out of his way too much to take the courses (in programming and digital) that were already available.

In the area of suggested improvements, among the many diverse opinions, there seems to be an emergent theme: many of the graduates felt the need for more on electronics, and related in device physics and semiconductor.

This is a need that we have felt as well from our industry people, such as Micron and AMI, who might hire our undergraduates. They need people skilled in the electronics design area.

This is an area where we have also made responses as a department since these students graduated. We have hired Chris Winstead, who teaches in electronics and analog VLSI, as well as Krishan Shenai, who teaches microelectronics and power.

4 Issues Observed from Senior Exit Interviews

There were many comments made by the students in the Senior Exit Interviews. Rather than simply repeating these (they are on file and should be read), I point out some that were particularly interesting or general.

- The students have definitely felt the turnover in the faculty. They comment on the importance of keeping the effective faculty teachers, and keeping them happy. There is a sense that too many of the faculty don’t care about effective teaching.
- From their perspective, some classes use too much power point, to the exclusion of interactive teaching. Power point has a place, but it should be a small one!
- On the positive side, there is good appreciation for the labs in the courses. We definitely need to keep the labs around and continue to work to strengthen them.

5 Issues Observed from Faculty Course Assessments

In the following, brief summary information gathered from the course assessments is presented. In particular, if the information seems to be of a nature that the committee should be aware of this and/or act upon it, or if a commitment of resources could help improve things, then it is noted here. But if an instructor makes a comment relevant to in class issues, it is not noted here. The intent is to provide a document that will help us close the loop in improving the process.

2530 (Bunker) Annette made the observation that this class seems particularly well-prepared. We should watch them — we should expect great things of them.

4740 (Douplnik) Facilities: VMware on public lab machines to give each person a test machine, rather than 4-5 people per real machine.

5780 (Eames) Add 3710 as prerequisite for 5780. Students need greater strength in programming skills.

6 (a)–(k) Outcome Assessment

This year we have only made plans for this assessment. The actual data collection and evaluation will begin starting Fall 2006.
7 Recommendations from last year

Here is the response to the issues that were identified as significant last year. We have not dealt with all of them, but some changes have been made. The issues are expressed in SMALL CAPS and the departmental response to them is in regular (Roman) font.

- **SPLIT 3620/3640 INTO A SECTION EACH SEMESTER. ADDRESS WHETHER THIS IS THE BEST WAY TO USE OUR TEACHING RESOURCES, OR WHETHER THERE ARE MORE EFFECTIVE USES (SUCH AS THE POSSIBILITY OF BRINGING PROBABILITY BACK FROM THE MATH DEPARTMENT).**

  After some discussion, it has been decided to keep 3620/3640 with one section each year and not split it. This provides better use of our teaching resources.

  We are still building faculty strength after several changes. While there is still a desire from both the faculty and students to bring back probability, we don’t feel like this is the time to do it.

- **MODIFY 3620 AND ADJUST PREREQUISITE STRUCTURE WITH 3410.**

  The teaching schedule has been modified so that 3410 is taught in the Spring semester. 3620 will then naturally be taken before it (in the Fall of the junior year). Students wishing more electronics can take 5420 in the Fall of the following year, where the course can also serve entering graduate students.

- **FIELDS FOR COMPUTER ENGINEERS?**

  After input from the computer engineering faculty and consultation of ACM guidelines, this course has been removed from the computer engineering requirements.

- **WHOLE COMPUTER ENGINEERING DEGREE PROGRAM.**

  This work is still needing reconsideration. Dyke Stiles is retired, Alan Shaw is retired, Joe Doupnik is leaving Spring 2006, Annette Bunker is leaving Spring 2006. We have had a search for replacement computer engineering positions, but have not made a hire yet. All of these things mean that the computer engineering program is still continuing with the courses covered, but without the exhaustive look at what the program should become.

  There simply has not been the manpower nor experience available to take on the task.

  This work is especially needed, since starting this fall we will have a graduate degree in computer engineering.

- **MOBILE ROBOTS?**

  This course has been covered this year by Don Cripps of ASI. For the immediate future this will continue this way, since this is a popular course for the students.

- **PREREQUISITE FOR 2530.**

  Still using the same prerequisites. When the entire computer engineering program is revisited, this issue will be resolved.

8 Curricular/assessment work this year

- **Assess impact of new physics course.**

  Students are now required to take the physics course. We have no specific information yet about how students are doing in the physics course, nor how it is affecting the electronics. This year we should be able to gather some information in this regard from the the graduating seniors.

- **Hire new faculty and incorporate them into the program.**

  We have hired Krishna Shenai, who will contribute in the area of electronics and power systems. We have hired Edmund Spencer, who will contribute to space and electromagnetics, and Reyhan Baktur, who will contribute to electromagnetics. Each of these new members will need to appreciate the assessment process.

- **Reshaping the computer engineering degree.**

  This is initially more of a curricular work than an assessment effort, but assessment should be part of the whole process.
• Kick off the new (a)-(k) specific assessments.
  Starting this year we will be introducing some specific assessment mechanisms for these ABET outcomes. Most of the pieces are in place to start in the fall, but we need to make sure the faculty are on board and that pieces don’t fall through the cracks.

• Revise alumni survey
  With the new objectives, a more targeted survey can be devised. This needs to be done before the survey is sent out in the fall.
Whether you buy a toaster or a video camera, it seems that everyone wants to know how you like the product and the service that came with it. Ideally, this information is used to improve the product in the future.

Well, you paid a lot of time and money for an education from Utah State University, and we want to know how it went for you. We are not merely casually interested. We are charged by our accreditation board (ABET) to produce students who meet certain objectives — objectives which are defined years after graduation! We need to hear from you to see how well what we provided to you while you were a student here has served you in achieving our objectives that we hoped for you.

Here are the objectives — the long-term goals — that are established for the Electrical Engineering Major.

- Contribute to engineering practice, advance engineering knowledge, and contribute to the good of society.
- Are advancing their education in engineering or other professions.
- Take a leadership role in engineering and society.

And here are the objectives for the Computer Engineering Major.

- Apply fundamental principles, to solve practical engineering problems.
- Are continually engaged in professional, personal, and community development.
- Are implementing well-planned, top-down designs of complex systems.
- Function well as team members and interact well with other professionals and non-engineers.

Please provide a thoughtful response to the following questions and return it to us in the envelope provided.

1. What size T-shirt would you like? (M, L, XL, XXL None)  
   (To say thanks for helping us out with this survey, we will send a T-shirt back to you if you send in this survey. We’ll try to send the size you indicate.)

2. If you want a T-shirt, we will need your address to send it back. (This means that your comments won’t be anonymous.) Your address:  

   7
In the following questions, please circle responses as appropriate. Also, please feel free to add additional written feedback on the lines provided.

3. Were you an Electrical Engineering Major or a Computer Engineering Major?

Electrical Engineer  Computer Engineer

4. Are you employed as an engineer or in an engineering-related position?  Yes  No

5. If the answer to the previous question is “no,” have you found that your engineering education at USU has helped you arrive at your current position?  Yes  No

6. Have the technical courses at USU equipped you with fundamentals in math, science, and engineering appropriate for your current position

1 = not at all  2  3  4  5 = very much

7. Are there ways in which your education at USU could have been modified which would have improved your abilities to make professional and societal contributions? Circle all that apply

OK as is  more physics  more math  more electronics  more English
more digital  more programming  more EM  more business  more biology
Other (please specify): ________________________________

8. Compared to your professional peers with similar education levels from other institutions, how do you feel the technical aspects of your engineering education compares to theirs?

very poorly  1  weakly  2  about equal  3  stronger in some areas  4  generally stronger  5

9. Identify professional development/educational activities have you done since graduating with your B.S.

graduate school  in-house training  technical conferences  technical reading  professional collaborations
Other (please specify): ________________________________

10. To what extent do you consider yourself a leader in your field and/or your community?

1 = not a leader  2  3  4  5 = strong leader

11. To what extent has your education at USU prepared you with design skills and tools necessary to contribute to your profession?

1 = poorly  2  3  4  5 = strong

12. To what extent has your education at USU prepared you to function as a contributing team member?

1 = poorly  2  3  4  5 = strong
13. To what extent has your education at USU prepared you for interaction with other people in your professional life?

1 = poorly  2  3  4  5 = strong

14. To what extent has your education at USU provided you with appropriate written and verbal communication skills? How could the program be modified to further strengthen these skills?

1 = poorly  2  3  4  5 = strong

15. What is the extent to which your engineering education at Utah State University has helped you make contributions to your profession and to society.

not much  a little  some  quite a bit  a great deal

16. To what extent are you involved (or have been involved) in community or professional service activities?

1 = not much  2  3  4  5 = very involved

17. What did you like best about our ECE program?

18. If you could change one thing in the program, what would it be?

Thanks for your input!
Appendix: 3620/3640 Curriculum discussion

Modified 3620-3640 Curriculum
Todd K. Moon
July, 2005

C Introduction

This document describes proposed changes to the 3620-3640 curriculum, and the history and rationale that have led to this point.

D History

The proposed change is a response to a transient still in effect from the change from quarters to semesters, and is enabled by a recent change in the teaching load associated with the courses in the department.

Under quarters, students took a two-quarter sequence in circuits, EE 210-211, preparing them in the basics of DC and AC circuit analysis, sinusoidal steady-state analysis, frequency response, and Bode plots. This gave them a foundation to proceed to a two-quarter sequence of electronics, as well as a three-quarter sequence on signals and systems.

With the change to semesters and the cap on credit hours, some compromises were made. The two quarters of circuits were reduced to one semester, ECE 2410. At one point, some additional material that spilled over from the two quarters was attempted in a course prior to 2410, but it was felt that students didn’t have the background and maturity necessary to deal with the material.

Until recently, 3410 and 3420 were taught as a two-semester sequence of electronics, with 3620 being a pre-requisite to 3410. There was some awkwardness, however, with having 3620 in the Fall, with 3410 in the Spring, with 3420 the following Fall. In an attempt to smooth the flow somewhat, the flow was changed somewhat so that 3410 and 3620 are co-requisite. The hope was that with PN junctions, diodes, BJTs, and FETs coming first in the 3410 course, students would have seen the necessary prerequisite material in the 3620 course and be prepared. However, experience has shown that the students are inadequately prepared. This has led to pressure to increase the material covered in 2410, so that students tend to emerge overwhelmed and underpracticed. There has been a strong sense that students are entering 3410 unprepared, and as a result leaving without the strength in electronic circuits that would be desired.

Recently, the department has eliminated 3420 as a core requirement, introducing ECE 5420 as a technical elective for the electrical engineers. In addition, the 3410 course is now taught every semester. These changes open up the possibility of changing the curricular flow. These changes, in conjunction with reorganization and a greater circuits emphasis in the 3620-3640 courses, should prepare students for 3410 and the upper level courses that the 3620-3640 courses feed into.

There is a need for a careful balance. There is a feeling among some in the department that this sequence is badly broken, while other feel that the course is within an epsilon or two of being perfectly adequate, particularly when the pre-requisite structure is adjusted. Care is needed to not lose material that is necessary for the many follow-on courses which depend upon this material.

E Curricular flow

Under the proposed changes, 3620 is a prerequisite for 3410, not a co-requisite. In order to balance the class sizes, students majoring in Electrical Engineering and Computer Engineering are advised to take 3410 in different semesters, as outlined below.

Electrical Engineering

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<th>Fall</th>
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<td>ECE 3620</td>
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In this framework, computer engineering students take two semesters of signals and systems, providing them with some extra experience in abstraction and computation (which is to their benefit, and frequently needed).

**F Textbooks**

There are currently two textbooks being used by the 2410 students, Nilsson and Riedel (NR) and Thomas and Rosa (TR). At the beginning of 3620, it is necessary to teach from a circuits text, to establish the proper circuits orientation and to round out the circuits orientation that was previously available. Teaching the circuit-focused material in ECE 3620 will require a common text. Therefore, it is proposed that the necessary chapters from NR be made available to students — who either studied out of the other text or has sold their book back — by means of copyright clearance through the bookstore.

**G Objectives**

These courses provide the theoretical foundation for advanced work in electrical engineering while rounding out the circuit understanding.

The remodeled courses should achieve the following:

1. Provide students with the necessary signals and systems background to prepare them for upper level work in controls (ECE 5310), mechatronics (ECE 5320), digital signal processing (ECE 5630), real-time processing (ECE 5640), communications (ECE 5660), wireless communications (ECE 5870), fields and waves (ECE 5800), and electromagnetic compatibility (ECE 5480).

   These skills include: familiarity with time-domain and frequency domain analysis using transforms appropriate for the domain and including concepts of convolution, impulse response total response in both continuous and discrete time; sampling theorem and its consequences; filter structures and implementations; properties of transforms leading to applications in communications (e.g., modulation and quantitative concepts of bandwidth) and systems analysis (e.g., stability); basic block diagram operations (including simple feedback); rudimentary familiarity with numerical techniques for differential equations; vector space concepts leading to Fourier series, generalized Fourier series, and signal space concepts; basic understanding of interpretation of the DFT (FFT) — meaning of bin numbers, spectral leakage, zero padding; practical knowledge and experience by implementing concepts using C++, while providing a hands-on introduction to MATLAB and SIMULINK.

2. Provide students with sufficient practice and experience that they are confident in dealing with circuits with the following elements: branch elements (R, L, and C); op amps; dependent sources; ideal transformers; and mutual inductance. While students are exposed to these concepts from ECE 2410, additional practice and emphasis is necessary for students to have confidence.

3. Complex power concepts, including: instantaneous power, reactive power, power factor, maximum power transfer, impedance matching (including using transformers for matching).

4. Second-order systems, including: damping (under-, over-, and critically-), resonance, natural frequency, Q (including Q of components such as inductors and the energy flow in resonant circuits).

5. Frequency response of circuits and systems, including magnitude and phase response. Effect of pole-zero placement on frequency response.
6. Filter types: LP, BP, HP, etc.
8. Sinusoidal steady-state analysis (rounding out the introduction from 2410).
9. First and second order poles; recognizing filter types from simple circuits (e.g., lowpass RC or RL, highpass RC or RL).
10. Introduction to standard filter models: Butterworth, Chebyshev, Elliptical, and Bessel-Thompson.

This lengthy set of material has almost all been covered in the past in these courses (with the exception of a discussion of Q and circuit analysis and matching using transformers), with a rather efficient and reinforcing presentation afforded by interleaving continuous and discrete time concepts. However, in the interest of preparing students for 3410, some reordering of the material is necessary.

Note: In order to provide students with circuit practice, and to provide concrete examples of systems concepts, essentially every homework assignment and quiz throughout the semester should present at least one circuit-based problem.

A proposed order of materials is:

3620
1. Review of fundamental circuit concepts
   - Branch laws for R, C and L; KVL; KCL.
   - Dependent sources.
   - Writing multiple loop and node equations for complicated
2. Complex Power (NR Chapter 10). (Include some exercises on transformers and ideal transformers from NR chapter 9.)
4. Introduction to Systems
   - Classification of Systems
   - Simultaneous Differential Equations
   - State Space Descriptions
5. Time-domain analysis of continuous-time systems
   - Zero-input response
   - Delta functions and impulse response
   - Convolution
   - Insights in system behavior
6. Laplace Transform Analysis
   - The Laplace Transform defined
   - Properties
   - Solution of integrodifferential equations.
   - Transfer functions. Relationship between impulse response and transfer function.
   - Transforming circuits directly. Transfer functions of RLC circuits and active circuits. (Include extra practice problems on controlled sources, transformers and ideal transformers.)
   - Block diagram operations.
• Frequency response. Dependence of frequency response on poles and zeros of transfer function.
• Bode plots. Second order Bode plots; resonance and damping. (Include discussion of circuit Q, developing $Q = L/R$ idea. Also, make sure exercises with Bode plots of systems with mutual inductance are presented, with opportunity to explore effect of mutual inductance.)
• System realizations.
• Introduction to filters. Lowpass, highpass, bandpass. Butterworth, Chebyshev, Bessel-Thompson, Elliptic.

3640

1. Fourier series and generalized Fourier series
   • Vector spaces. Bases and orthogonality.
   • Inner products in discrete and continuous vector spaces.
   • Approximation in vector spaces.
   • The trigonometric Fourier series and the exponential Fourier series.
   • Gibbs phenomenon.
   • Signal spaces and an introduction to digital communications

2. The Fourier transform
   • Review of Fourier series
   • Extension to Fourier transform
   • Transforms of some basic signals.
   • Properties and applications of Fourier transform (including modulation, differentiation, etc.)
   • Bandwidth definitions.

3. The sampling theorem and applications.

4. Discrete-time systems
   • Difference equations.
   • Impulse response; discrete convolution;
   • Total response.
   • System stability.

5. Discrete-time analysis: The $Z$ transform
   • The $Z$ transform defined.
   • Properties of the $Z$ transform.
   • $Z$ transform solution of difference equations.
   • Frequency response of discrete-time systems, including magnitude and phase response; linear phase filters.
   • System realizations. FIR and IIR filters.

6. The DFT/FFT
   • Connecting the DTFT to the DFT.
   • Interpreting the bin numbers.
   • Spectral leakage and zero padding.
   • Fast convolution.
1. For the following circuits, determine the transfer function $H(s) = \frac{V_o(s)}{V_i(s)}$ or $H(s) = \frac{I_o(s)}{I_i(s)}$, as appropriate. For each, determine the Bode plot, identifying key frequencies (e.g., corner frequencies or resonant frequencies) and amplitudes (e.g., low-frequency gain, high-frequency gain) as a function of the resistor, capacitor, and inductor components. Hint: Use voltage or current divider rules where possible. Identify the type of filter (e.g., lowpass, highpass, bandpass, etc.) These building blocks will be useful to you throughout your career. **Memorize these results!**

(a) \[ v_o(t) \quad R \quad v_i(t) \]

Note that the capacitor across the output acts as a low-pass filter, shorting out time-varying signals.

(b) \[ v_i(t) \quad L \quad v_o(t) \]

Note that the inductor across the output acts as a high-pass filter. At DC, the inductor just looks like a wire, and DC signals are shorted out.

(c) \[ v_i(t) \quad R \quad v_o(t) \]

Note that the capacitor in series acts as a DC-blocker (i.e., high-pass filter) — DC current cannot get through the capacitor.

(d) \[ v_i(t) \quad R \quad L \quad v_o(t) \]

Note that the inductor in series acts as a low-pass filter, since DC current is not impeded by the coil (wire).

(e) \[ I_i(t) \quad R \quad C \quad I_o(t) \]

Note that the capacitor across the output does not let DC current through; this circuit acts as a high-pass filter.

(f) \[ I_i(t) \quad C \quad R \quad I_o(t) \]

At low frequencies, all the current must pass through the resistor. At high frequencies, the current passes through the capacitor.

(g) \[ I_i(t) \quad L \quad v_o(t) \]

At low frequencies, all the current passes through the inductor.

(h) \[ I_i(t) \quad R \quad L \quad I_o(t) \]

At low frequencies, all the current passes through the inductor.

(i) \[ v_i(t) \quad C \quad L \quad v_o(t) \]

What is the impedance at DC? What is the impedance at high frequencies? What happens at resonance?

(j) \[ v_i(t) \quad R \quad C \quad L \quad v_o(t) \]

What happens at resonance?

(k) \[ v_i(t) \quad R \quad L \quad v_o(t) \]

What happens at resonance?

(l) \[ v_i(t) \quad C \quad L \quad v_o(t) \]

What happens at resonance?

2. For the following op-amp circuit:
(a) Determine the transfer function in terms of the impedances $Z_i$ and $Z_f$.

(b) Fill in the following table, by plotting the pole-zero plot and the transfer function. The first entry is completed as an example.

<table>
<thead>
<tr>
<th>#</th>
<th>$Z_i$</th>
<th>$Z_f$</th>
<th>pole-zero plot</th>
<th>$H(s)$</th>
</tr>
</thead>
<tbody>
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<td>(example) 1</td>
<td>$\frac{1}{K}$</td>
<td>$\frac{1}{K}$</td>
<td></td>
<td>$-\frac{K}{s}$</td>
</tr>
<tr>
<td>2</td>
<td>$\frac{1}{K}$</td>
<td>$\frac{1}{K}$</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>$\frac{1}{Kz_2}$</td>
<td>$\frac{1}{K}$</td>
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<td></td>
</tr>
<tr>
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<td>$\frac{K}{p_1}$</td>
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<td>$\frac{K}{p_1}$</td>
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<tr>
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<td>$\frac{K}{p_1}$</td>
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