Composition: Electronic Media I
025:250
Fall, 1994

Larry Fritts
2060 MB
365-1666
Office hours:
M, W: 9:30-11:30
Open studio hours:
T, Th: 1:30-3:00

Course Description: The course is an introduction to the concepts, techniques, technology, and history of electronic music composition. Material will be presented by means of lecture/demonstrations and students will gain hands-on experience through in-class tutorials and outside-of-class studio projects. Topics to be covered include acoustics, audio theory, compositional structures and techniques, tape recording and manipulation, digital synthesis, and MIDI sequencing with a computer.

Course Objectives: Through experience gained in producing several short studio projects, students will complete two compositions, one for tape and the other using MIDI. In doing so, they will have demonstrated that they have acquired the basic skills necessary to operate tape and mixing systems, as well as computer-based MIDI programs. Acquisition of these skills will prepare students for advanced work in digital editing and computer music.

Grading: Final grades are based on work in the following areas:

- Studio Exercises: 20%
- 2 Compositions, 15% each: 30
- 2 Quizzes, 15% each: 30
- Final Exam: 20

Reading: Xeroxes of selected readings from the literature have been placed on reserve in the Music Library. Articles should be read before each class meeting, as indicated in the calendar below.

Studio Time: Each student will be able to reserve studio time for up to 4 hours per week. Students may also sign up for additional time on a weekly basis.

Open Studio Hours: The studios will be un-reserved on Tuesdays and Thursdays from 1:30-3:00. The instructor will be available to help with any problems.

Studio Exercises: Students will complete several short exercises which are designed to develop technique and which may be incorporated into the two larger compositions.

Compositions: Students will complete two compositions. The first will be a concrète piece of approximately 3 minutes duration. The second will be a MIDI piece which may be combined with concrète sounds (which might consist of excerpts or out-takes from the concrète piece, or may even consist of the entire concrète piece itself). The second piece should be at least 5 minutes in length.

Quizzes: Two quizzes will be given. These will be in a multiple choice and essay format and will cover general material from the readings, any material from the lectures, and basic operations of the studios.

Final Exam: The final exam will be given on Wednesday, Dec. 14 at 2:15 PM. It will be cumulative and will include multiple choice and essay questions.

Calendar

Aug. 22  Lecture: Musical Objects and Transformations
           Tutorial: Studio orientation
           Read: Boulez, pp. 19-29; Russcol, pp. 76-86.

Aug. 24  Lecture: Vibrating Systems, Sound Waves, and Electrical Systems
           Tutorial: Signal routing
           Read: Gulick, pp. 19-31.

Aug. 29  Lecture: Tape Recorders
           Tutorial: Tape pre-operation and playback
           Read: Ciamiga, pp. 94-103.
Aug. 31  Lecture: Microphones  
         Tutorial: Tape recording

Sept. 5  No class

Sept. 7  Lecture: Musique Concrète  
         Tutorial: Tape speed and direction manipulation.  
         Read and listen: Schaeffer, Tapes 1-3 with accompanying text.

Sept. 12 Lecture: Musique Concrète  
         Tutorial: Tape splicing  
         Read and listen: Schaeffer, Tapes 1-3 with accompanying text.

Sept. 14 Lecture: Musical Form, Direction, and Stratification  
         Tutorial: Tape dubbing and mixing

Sept. 19 Lecture: Harmonics, Waveshape, and Timbre  
         Read: Backus, pp. 107-124.

Sept. 21 Lecture: Filtering and Equalization  
         Tutorial: Mixer equalization (EQ), Allison filter, B & K graphic EQ  
         Read: Strange, pp. 49-65.

Sept. 26 Lecture: Pitch, Frequency, and Modulation  
         Tutorial: 20/20 frequency shifter and tape vari-speed control  
         Read: Strange, pp. 12-20.

Sept. 28 Lecture: Effects of Delay on Phase  
         Tutorial: Lexicon digital delay

Oct. 3  Tutorial: Multi-track recording and mixing

Oct. 5  Tutorial: Multi-track recording and mixing

Oct. 10 Quiz #1  
         Tutorial: Studio 3 orientation

Oct. 12 Lecture: Introduction to MIDI  
         Tutorial: Computer sequencing with Vision  
         Read: Loy, pp. 8-26.

Oct. 17 Lecture: MIDI Protocol  
         Tutorial: Sequencing with Vision  
         Read: Moore, pp. 19-28.

Oct. 19 Lecture: Principles of Sound Synthesis  
         Tutorial: Voice editing with Galaxy editor/librarian

Oct. 24 Tutorial: Casio voice-editing

Oct. 26 Tutorial: Casio voice-editing

Oct. 31 Lecture: MIDI Objects and Transformations  
         Tutorial: Advanced sequencing

Nov. 2  Tutorial: Advanced sequencing

Nov. 7 Quiz #2  
         Lecture: History of Electronic Music: Pre-20th Century Instruments  
         Read: Rhea, pp. 59-63.
Nov. 9  Lecture: History of Electronic Music: 1900-1948  
Read: Griffiths, pp. 7-29; Stuckenschmidt, pp. 174-192.

Nov. 14 Lecture: History of Electronic Music: Tape Studios of the 1950s

Nov. 16 Lecture: History of Electronic Music: Tape and Electronic Studios of the 1950s  
Read: Eimert, pp. 1-10.

Nov. 21 Lecture: History of Electronic Music: Voltage-Controlled Synthesizers of the 1960s  
Read: Roads, pp. 9-18; Eaton, pp. 54-56.

Nov. 23 No class

Nov. 28 Lecture: History of Electronic Music: Voltage-Controlled Synthesizers of the 1960s  
Read: Holmes, pp. 76-84.

Nov. 30 Lecture: History of Electronic Music: Computer Music  
Read: Tenney, pp. 24-33.


Dec. 14 Final Exam (cumulative).  Wednesday, 2:15.

**Required Reading**


Chap. 6, pp. 76-84.


Studio Policies

1. You will be assigned a set of studio keys. If you lose these or fail to turn them in to Kirk Corey by the last day of the quarter, the locks will have to be re-keyed at a cost to you of $100.

2. Do not leave the door to the studio open if you are not in the room.

3. No food, drinks, or smoking allowed in the studios.

4. Clean up the studio when you are finished working. Put away your papers, tape supplies, patch cords, etc. The studio should be ready to use by the next person after you are finished.

5. Powering up:  a) Make sure that the tape recorders and power amps are off.
   b) Turn on the main power
      i) In Studio 1, this is the switch under the console beneath Tape 1.
      ii) In Studio 2, these are the 3 circuit breakers on the metal box directly to the right as you enter the room.
      iii) In Studio 3, this is the power strip on the right rear corner of the audio rack.
   c) Turn on tape recorders, power amps, and other equipment you will be using.

6. Powering down:  a) Turn off tape recorders and power amps.
   b) Leave processing equipment on.
   c) Turn off main power.

7. In order to avoid damage to the speakers and/or your eardrums, always turn down the volume of the power amps immediately if an audio loop or feedback occurs.

8. Report any problems to Larry Fritts or Kirk Corey.
### Studio 1 Patch Bays

#### Patch Bay #1

<table>
<thead>
<tr>
<th>Channel Inputs</th>
<th>Output Faders</th>
<th>Monitor Out</th>
<th>Sum Out</th>
<th>Effect Out</th>
<th>Effect In</th>
<th>Allison Filter In</th>
<th>Allison Filter Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in 2 in 3 in 4 in 5 in 6 in 7 in 8 in</td>
<td>L out R out out out</td>
<td>out</td>
<td>out</td>
<td>out</td>
<td>out</td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>

1 out 2 out 3 out 4 out 5 out direct outputs 6 out 7 out 8 out L out R out output faders monitor sum effect L out R out level outputs

#### Patch Bay #2

<table>
<thead>
<tr>
<th>Tape 1 2 3 4 4-track 5-track</th>
<th>Cassette</th>
<th>Power Amp</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in 2 in 1 in 2 in 1 in 2 in</td>
<td>1 in 2 in</td>
<td>1 in 2 in</td>
</tr>
</tbody>
</table>

1 out 2 out 1 out 2 out 1 out 2 out 1 out 2 out 3 out 4 out 1 out 2 out
Ross Mixer

- **line input**: Plug from patch bay permanently inserted. Overrides mic input.
- **mic input**: To record from mic, plug in here and pull out plug from line input.
- **gain**: Normally set to 10 dB. Increase gain only if fader volume at -10 dB isn't loud enough.
- **treble**: Boosts high frequencies from -20 to +20 dB. Set to 0 for flat EQ.
- **mid**: Boosts midrange frequencies from -20 to +20 dB. Set to 0 for flat EQ.
- **bass**: Boosts low frequencies from -20 to +20 dB. Set to 0 for flat EQ.
- **monitor**: Sends signal to monitor output.
- **effect**: Sends signal to effects unit. Not used in current configuration.
- **pan**: Determines how much of the channel output is sent to left and right outputs.
- **fader**: Should normally be set from -20 to -10 dB. For a louder signal, turn up the gain knob above.

- **VU LEDs**: Show output levels.
- **left sum**: VU switches select left, right, sum, or monitor output levels to be shown by VU LEDs.
- **right monitor**: Effect send controls mono output of channel effect signals.
- **effect return**: Effect return controls the input of the effect device.
- **sum**: Sum controls the mono output of left and right channel faders.
- **effect pan**: Effect pan determines how much of the effect return is sent to left and right fader outputs.
- **monitor**: Monitor controls the mono output of channel monitor signals.
- **L out**: Left and right faders control left and right outputs.
- **R out**: Level controls the overall level to a separate stereo output of channel faders and to the phones jack.
- **phones**:
Ross mixer signal path
Studio 2

Top view

- Rack 1
  - Quantum mixer
  - Patch bay #1
  - Patch bay #2
  - Patch bay #3
  - Pioneer cassette
  - Symetrix compressor

- Rack 2
  - Lexicon digital delay
  - 20/20 frequency shifter (front panel input and outputs)
  - Tektronix oscilloscope
  - Crest Audio amp 1
  - Ch A to speaker 1
  - Ch B to speaker 2
  - Crest Audio amp 2
  - Ch A to speaker 3
  - Ch B to speaker 4

- Rack 3
  - B & K equalizer
  - Rev-7 reverb
### Ampex ATR-700

**Diagram:***
- **Supply Reel**
- **Take-up Reel**
- **Head Housing**
- **Erase Head**
- **Record Head**
- **Repro Head**
- **Left Tension Arm**
- **Impedance Roller**
- **Pinch Roller**
- **Upper Guide of Shut-off Arm**
- **Lower Guide of Shut-off Arm**
- **Drive Roller**
- **Tape Counter**
- **Memory**
- **Reset**

### Chart:***

<table>
<thead>
<tr>
<th>Ch 1</th>
<th>Ch 2</th>
<th>Speed</th>
<th>Reel</th>
</tr>
</thead>
<tbody>
<tr>
<td>• record</td>
<td>• record</td>
<td>high (15 ips)</td>
<td>large (10.5&quot;&quot;)</td>
</tr>
<tr>
<td>• ready</td>
<td>• ready</td>
<td>low (7.5 ips)</td>
<td>small (7&quot;&quot;)</td>
</tr>
</tbody>
</table>

### Indicators:***
- **Indicator Lights:**
  - Record
  - Pause
  - Play
  - Rewind
  - Fast Forward
  - Stop

### VU Meters:***
- **Ch 1**
- **Ch 2**

### Inputs:***
- **Input A**
- **Input B**
- **Master Record**
- **Output Ch 1**
- **Output Ch 2**

### Controls:***
- **Record Bias**
- **EQ**
- **Record Level**
- **Monitor Input Tape**
- **Input Tape Ch 1**
- **Input Tape Ch 2**
- **Power**
Ampex ATR-700 Operations

PRE-OPERATION
1. Patch tape outputs (at patch bay) into: a) desired mixer inputs for monitoring or mixing, or b) inputs of another tape recorder for dubbing
2. Patch into tape inputs (at patch bay): a) desired mixer outputs, or b) outputs of another tape recorder for dubbing
3. Turn power on.
4. Turn off: a) vari-speed (depressed position; indicator light off) b) edit (depressed position; indicator light off)
5. Select: a) reel size (usually small or 7") b) tape speed (usually high or 15 ips) c) position 2 for EQ, bias, and line.
6. Place tail-out reel of tape on take-up spindle and thread onto empty supply reel (see diagram for tape path). 7. Press rewind to spool tape onto the supply reel.
8. Set tape counter to 0000.
9. Use fast forward or rewind to position the tape for playback or record. Press lift defeat to monitor the tape in fast forward or rewind (turn down the output first).

PLAYBACK
1. Do pre-operations 1-9.
2. Set sync/repro switches to repro.
3. Set record ready/safe to safe.
4. Set both monitor switches to tape.
5. Set output control knobs to 3 o'clock.
6. Press play button to begin tape playback.
7. Press stop button to stop tape playback.

RECORDING
1. Do pre-operations 1-9.
2. Set sync/repro switches to repro.
3. Set ready/safe switch for the channel to be recorded to ready.
4. Set monitor switch for the channel to be recorded to input.
5. Set output control knob for the channel to be recorded to 3 o'clock.
6. Set master control knob to 2 o'clock.
7. Set input A control knob for the channel to be recorded for 0 dB VU level.
8. Press and hold record button (button & channel indicator lights on). Hold down record button and press play.
10. Press stop button to stop recording.

SYNC RECORDING
1. Do pre-operations 1-9.
2. Set sync/repro switch to sync for the channel used for playback.
3. Do playback operations 3-5 for channel used for playback.
4. Do record operations 3-10 for channel to be recorded.

EDITING
1. Do pre-operations 1-9.
2. Do playback operations 1-5.
3. Press edit to bring tape into contact with repro head.
4. Move reels manually to locate desired section.
5. Warning: pressing play will dump the tape since the take-up reel is inoperative in edit mode.
Tascam 34B Operations

PRE-OPERATION
1. Patch tape outputs (at patch bay) into: a) desired mixer inputs for monitoring or mixing, or b) inputs of another tape recorder for dubbing
2. Patch into tape inputs (at patch bay): a) desired mixer outputs, or b) outputs of another tape recorder for dubbing
3. Turn power on.
4. Turn off: a) pitch control (knob in) b) edit (button out)
5. Select: a) reel size (usually small or 7") b) tape speed (usually high or 15 ips)
6. Place tail-out reel of tape on take-up spindle, lock into place with reel lock, and thread onto empty supply reel (see diagram for tape path).
7. Press rewind to spool tape onto the supply reel.
8. Set tape counter to 0000.
9. Use fast forward or rewind to position the tape for playback or record. Press cue to monitor the tape in fast forward or rewind (turn down the output first).

PLAYBACK
1. Do pre-operations 1-9.
2. Set output select switch to repro (indicator light on).
3. Set all function select switches to safe (indicator lights off).
4. Set channel output control knobs to cal.
5. Press play button to begin tape playback.
6. Press stop button to stop tape playback.

RECORDING
1. Do pre-operations 1-9.
2. Set output select switch to input.
3. Set function select switch for the channel to be recorded to record (indicator light flashes).
4. Set input switch for the channel to be recorded to line for signals coming from patch bay (indicator light off).
5. Set output control knob for the channel to recorded to cal.
6. Set input control knob for the channel to be recorded for 0 dB VU level.
7. Press and hold record button (button indicator light on & function select channel indicator light is steady). Hold down record button and press play.
8. To pause during a recording, press pause button (indicator light on). To resume recording, press play.
9. Press stop button to stop recording.

SYNC RECORDING
1. Do pre-operations 1-9.
2. Set output select switch to sync.
3. Do playback operations 3-4 for channels used for playback.
4. Do record operations 3-9 for channels to be recorded.

EDITING
1. Do pre-operations 1-9.
2. Do playback operations 1-4.
3. Press cue to bring tape into contact with repro head.
4. Move reels manually to locate desired section.
5. Warning: pressing edit then play will dump the tape since the take-up reel is inoperative in edit mode.
Ampex AG 440 Operations

PRE-OPERATION
1. Patch tape outputs (at patch bay) into: a) desired mixer inputs for monitoring or mixing, or
   b) inputs of another tape recorder for dubbing
2. Patch into tape inputs (at patch bay): a) desired mixer outputs, or
   b) outputs of another tape recorder for dubbing
3. Turn power on.
4. Select: a) reel size for both supply reel and take-up reel (usually small or 7”)
   b) tape speed (usually high or 15 ips)
5. Place tail-out reel of tape on take-up spindle and thread onto empty supply reel (see diagram for tape path).
6. Press rewind to spool tape onto the supply reel.
7. Use fast forward or rewind to position the tape for playback or record.

PLAYBACK
1. Do pre-operations 1-7.
2. Set output selector switches to repro.
3. Set record selector switches to safe.
4. Set output control knobs to 3 o’clock.
5. Press play button to begin tape playback.
6. Press stop button to stop tape playback.

RECORDING
1. Do pre-operations 1-7.
2. Set output selector switch of channel to be recorded to input.
3. Set record selector switch for the channel to be recorded to ready (amber indicator light on).
4. Set repro level control knob for the channel to be recorded to 3 o’clock.
5. Set record level control knob for the channel to be recorded for 0 dB VU level.
6. Press and hold record button. Hold down record button and press play (red record indicator light on).
7. Press stop button to stop recording.

SYNC RECORDING
1. Do pre-operations 1-7.
2. For Ampex Tape 2: Set output selector switch to sync for the channel used for playback.
   For Ampex Tape 3: Set record selector switch to sel-sync for the channel used for playback.
3. Do playback operations 3-4 for channel used for playback.
4. Do record operations 2-7 for channel to be recorded.

EDITING
1. Do pre-operations 1-7.
2. Do playback operations 1-4.
3. Press edit to release reel brakes.
4. Move reels manually to locate desired section.