Study of Knee Joints with Spectral Analysis UDDHAB TI-
WARI, SANICHIRO YOSHIDA, AMANDA SALADINO, BROOKLNE HADLEY,
MAITRAM NGUYEN, JESSE HATCHETT , DANIEL HOLLANDER, Southeast-
ern Louisiana University — This research focuses on the explanation of the knee dy-
namics using the technique of spectral analysis. To understand the knee dynamics,
a force plate, a stethoscope and an electromyography (EMG) are used which collects
the data from the knee while performing different exercises at different rates. The
data obtained is the measurement of the ground reaction force and torque from the
feet, vibration of the knee joint, and electrical activity of the leg muscles. Thus ob-
tained data is then used for analysis mainly using the idea of Fourier spectrum and
transfer function. By observing the peak of the activity frequency, harmonics at the
multiples of the activity frequency, and analyzing the transfer functions of the force
and EMG signals in addition to acoustic signals, the knee dynamics can be under-
stood. The analysis also allows for the detection of knee problems such as arthritis,
injury, etc. to also be done. In future, we are planning to add accelerometer and
goniometer for a better understanding of the knee dynamics.

Sanichiro Yoshida
Southeastern Louisiana University