

Neural Prosthetic Engineering (3 Credits) 430.809.001

Department of Electrical and Computer Engineering
Seoul National University, simulcast to University of Tokyo

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Synopsis	Neural prosthesis is an electronic implant that interfaces with nervous systems. Through direct electrical stimulation of nerves, it can help restore damaged or lost sensory or motion functions. Typical examples include cochlear implant and retina implant recently developed for severely hearing and vision impaired patients respectively. More recently interfacing with neurons in brain draws more attention for both therapeutic and scientific purposes. In this lecture we will cover all engineering aspects of the various neural prostheses including auditory, visual prostheses, deep brain stimulation (DBS), and brain machine interface (BMI).															
Offering	2016 Fall semester															
Audience	Undergraduate (3 rd and 4 th year) and Graduate Students of all disciplines of Engineering															
Classroom	Room 429, Global Education Center for Engineers, Seoul National University															
Schedule	<u>Class</u> : Monday and Wednesday 11 am-12:15 pm															
Objective	To understand fundamentals of neural prosthetic engineering and their applications.															
Prerequisites	There is no particular requirements.															
Topics	<p>Neural Prosthesis (NP) Overview</p> <p>Fundamentals</p> <ul style="list-style-type: none"> Neurons Bioelectric Interface Bio-instrumentation <p>Major NP's</p> <ul style="list-style-type: none"> Cochlear implant Visual prosthesis Deep brain stimulation <p>Related Developments</p> <ul style="list-style-type: none"> Neuro-Regeneration/ MEA BMI/FES Neuro-Photonics <p>Regulatory Approval</p> <p>Term project</p>															
References	<ol style="list-style-type: none"> pdf files (uploaded before the class) D. Zhou, David and E. Greenbaum, eds. <i>Implantable Neural Prostheses 1: Devices and Applications</i>, Springer, 2009. P. Troyk and S. Cogan, "Sensory Neural Prostheses," in <i>Neural Engineering</i>, B. He, Ed., ed: Springer US, 2005, pp. 1-48. Other journal papers 															
Grading	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="width: 30%;">Final Exam</td> <td style="width: 40%; text-align: right;">30%</td> </tr> <tr> <td></td> <td>Homework</td> <td style="text-align: right;">20%</td> </tr> <tr> <td></td> <td>Term Project</td> <td style="text-align: right;">30%</td> </tr> <tr> <td></td> <td>Attendance</td> <td style="text-align: right;">20%</td> </tr> <tr> <td></td> <td style="text-align: right;">Total</td> <td style="text-align: right;">100%</td> </tr> </table>		Final Exam	30%		Homework	20%		Term Project	30%		Attendance	20%		Total	100%
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