ISP catalog 2015

ISP activity name	1) Hardcore Robotics Marathon
Instructor	Alexey Boyko, Mikhail Matrosov, Mazhar Ali, Denis Plotnikov
Description	This course is about 7 days of fun and hardcore full-cycle engineering. You will learn how to prototype a quite complicated cross-disciplinary project within tight timeframe. In the first 3-4 days we'll build a CNC foam cutting machine from scratch (soft, mechanics, electronics). In the next 3 days we'll use it to build flying RC planes or drones, and fly them. Course makes use of knowledge in mechanics, electronics, physics and software engineering. You'll learn how to bind together tons of LEGOs, nonLEGO parts, Arduinos, RasberryPies, OpenCV, Python, C++ and whatever else we find appropriate.
Expected outcomes	• Fun & hardcore 7-day learning-building session • Full-scale hands-on experience: manufacturing-mechanics-electronics-software • How not to be scared by complex systems • You try to build a lot of cool stuff and possibly get eternal glory • You will learn how to use and apply: o Basics of Python o Basics of OpenCV o Basics of Mechanical Shop o Arduino o Programming on Raspberry Pi or NXT/EV3 o learn basics of aeroplanes manufacturing o apply this knowledge to build, tune and fly your own RC plane!
Pre-requisites	Be prepared to learn quickly =)
Workload	54 hours
Learning activities	Mon-Thu: Architecting the system, building CNC cutter Thu-Sun: building drones
Assessment	pass \ fail (fail only if a person haven't done anything AND also didn't show up during more than 50% of days of the class)

ISP activity name	2) Soft skills tool box course
Instructor	Aliya Khayrullina, Board of European Students of Technology soft skills trainer Ekaterina Bolotskaya

Description	Most of the classes at SkolTech require a lot of team work especially on the term long projects. Working together with someone different from you is never an easy job but it doesn't have to be a total nightmare. Understanding that your difference is actually a strong tool rather than the apple of discord is essential for the projects to step up to the higher level. Due to what Soft skills tool box is designed for you to look at your team work, leadership and project management skills from the different angle. Soft skils tool box course will consist of 7 big parts. It will go through the entire way from meeting the team till the final presentation giving you the most needed skills on the way. It is not about lectures again, it is an interactive practice course with many exercises and tasks where you will need to implement your tools right away. 1) Project Management - 4 hours (stages of development from concept to the execution, tasks analysis, resources management. What kind of idea would you bring to life if you had unlimited resources? How different will this planning be from going to the groceries store planning?) 2) Team Building and Team Dynamics - 4 hours (forming the strong team through the understanding of differences and its' power, knowing the steps that team is going through, addressing the issues on time) 3) Leadership - 4 hours (going through team dynamics stages there is always a leader that needs to react fast to the changing environment and atmosphere in the team, either you are formal leader or not this practice lesson will help structurize or give the knowledge essential to have if you want to lead any kind of team in the future) 4) Communication - 4 hours (we will try to look at, understand and manage communication with babushkas in marshrutkas ;) because managing communication in the hardest situations has always been a great skill development for the future. We will also put the emphasis to the international environment and self-management). 5) Effective meetings and Facilitation - 2 hours (so that you are not spending 4 hours on useless discussions that are not leading anywhere we will open the box of managing discussions, bringing creativity and decision making tools for the best ideas to pop-up and outside stories and talks to stay at the cofee-breaks). 6) Conflict Solving - 2 hours (they happen in the team. And it's ok. You just need to know how to deal with them so that the working process doesn't stop and personal emotions are not getting touched) 7) Presentation Skills - 4 hours (and you finally have to present. Talking clearly, structirized, bringing creativity to the floor as well as many times pf practice. Presentation skills is not a talant - it's a skill. And there is only one person who is responsible for you reach it or not. You. I will just try to help find your own way). This course is designed and tested throughout the last 25 years specifically for the student environments for you to get better results spending less time and having more fun on the way.
Pre-requisites	No more than 20 participants. The class will be formed on first come first serve basis.
Workload	25 hours

ISP activity name	3) Video Production
Instructor	Punyapat Saksupapchon and Aliya Khayrullina Students will share knowledge and instruct each other. Ilan Goren (advisor) and Experienced Guest Speakers
Description	Learn about the video production process from creating a video to becoming a video producer. You will learn the basics of videography, storytelling, shooting, video editing, and how to be a successful video producer. You will have an opportunity to hear about the industry from experienced professionals and create your own videos professionally.
Expected outcomes	Building video producing skills for Skoltech students in order to help Skoltech communication office produce in-house high quality videos to promote Skoltech. Participants will record, create and edit videos of their other ISP courses or any of their interests and publish on our club's youtube channel.
Pre-requisites	12 people in class max
Workload	60 hours
Learning activities	1) Learn how to get started with choosing the right video equipment. 2) Learn how to tell a captivating story through video; how to find a compelling story, scriptwriting basics, shooting with thorough coverage on your topic, and putting images together in a way that entices your audience. 3) Learn about the technique behind shooting film and video, such as lighting, audio, and shot composition. You will also learn about how to shoot video on different platforms: DSLR video camera, basic camera, iPhone, and Flip Cam. 4) Learn video editing through software including iMovie, Windows Movie Maker, etc.
Assessment	Participants will use video producing skills to make videos telling interesting Skoltech stories in different aspects such as their other ISP courses or any of their interests, then publish the videos on our club's youtube channel.

ISP activity name	4) Stock Trading
Instructor	Alexander Ivanov

Description	If you have some money which is not enough to buy a flat, stock market is a good option to invest your savings. Average growth rate is higher than deposit rate in banks. By the way, third world richest man Warren Buffett has made his wealth by buying and selling stocks. In this course we will study trading basics. We will touch upon questions: 1. What is a stock market? 2. Moscow Exchange, NASDAQ, NYSE - what is the difference? 3. How to open a trading account and to make your first deal? 4. How to minimize/maximize risks? 5. What are the common approaches to trading? The number of classes may differ depending on students' interests.
Expected outcomes	1. Basic knowledge about stock markets and trading 2. Basic skills of trading on stock markets 3. Ability to analyze financial information 4. Ability to make decisions based on gathered financial information
Pre-requisites	None
Workload	60 hours
Learning activities	6 classes with lectures about stock markets and trading. Each class (except for the first and the last one) will contain a discussion. Each class will contain some time for Q&A session. For each class (except for the first and the last one) there will be a small assignment whether to read something or to write some thoughts (e.g. create a simple trading strategy). During some classes we will look at MOEX and NASDAQ for real-time stock prices and have practice with trading online. The last week of classes will be devoted to a trading competition when students will be trading on a real stock market using demo or real-money accounts.
Assessment	During the third (and the last) week there will be a trading competition, when students will be able to show their results on a real market using demo accounts or real-money accounts. This result will be assessed. Additionally, 2-3 quizzes will be held during classes to make sure that everyone is on track.

ISP activity name	**5) New training course connecting science with the industrial art of inventiveness.**
Instructor	Andrei Seryi

Description	Science has yielded a rich history of inventions, ones often inspired by Nature itself. Despite all this progress, we have always strived to find more efficient approaches to inventing. In fact, during the second half of the 20th century, the industrial world developed specific methodologies with which to promote inventiveness. Though powerful, these methods were rarely heard of outside of their field, let alone in the scientific community. The most advanced methodology, the so-called “theory of inventive problem solving”, has become, according to Forbes, the bedrock of innovations in such companies as Samsung. While the industrial inventiveness methods were originally created for engineering, their methodologies are universal and can also be applied to science. In this course we will learn how the theory of inventive problem solving can be used in various areas of science, arming us with a powerful and eye-opening amalgam of science and inventiveness.
Expected outcomes	Skills building
Pre-requisites	None
Workload	20 hours
Learning activities	Lectures, working groups activities (class will be split to several groups) on analysis of scientific discoveries in the view of the theory of inventive problem solving, presentation of the analysis results by the groups in a cooperative-competition manner, homework, analysis of homework in the class.
Assessment	Working groups activities will be assessed on a group basis. Homework will be assessed individually.

ISP activity name	**6) Fundamentals of Brain-Computer Interface Design**
Instructor	Andrey Vyatskikh
Description	A short course on the fundamentals of electroencephalogram (EEG)-based brain-computer interface (BCI) design. The activities will include lectures on basics of brain electrical activity and EEG analysis, as well as hands-on exercises in physiological signal acquisition, signal processing and pattern recognition. The course will include a group project, where teams develop their own algorithms to recognize person's intentions based on EEG. The course finishes with a competition of developed algorithms, where the winning team is selected based on the minimum recognition error.
Expected outcomes	Basic electronics Fundamentals of Brain Physiology Fundamentals of Signal Acquisition Fundamentals of Signal Processing Fundamentals of Machine Learning Team Building
Pre-requisites	Linear Algebra, Matlab
Workload	60 hours

Learning activities	Lectures: Basic electronics, Brain Physiology, Signal Acquisition, Signal Processing, Machine Learning Labs: Physiological signal acquisition (EKG), Physiological signal acquisition (EEG), Processing physiological signals Lab reports, homeworks Final Team Project: Development of EEG Pattern Recognition Algorithm
Assessment	Individual performance: homeworks, lab reports Team performance: team project

ISP activity name	**7) FPGA programming**
Instructor	Vladmir Eremin, Anton Lechanka
Description	We are going to introduce you to the world of field-programmable gate arrays (FPGAs). Within this course you will learn what FPGA can be useful for and in what applications they are shining. We are planning a few projects like Software Defined Radio (SDR), sound effects for electric guitar and processing video from a camera in real time.
Expected outcomes	Experience with FPGA programming, understanding the applicability of FPGAs in different designs.
Pre-requisites	Basic circuit design, digital electronics.
Workload	80 hours
Learning activities	20 hours of lectures on circuit design and FPGA specifics, 20 hours of lab sessions where students will be making small projects, 20 hours for final project in-class activities (like an application period). 20 more hours are expected to be spent by students working on their own.
Assessment	Each lab will be graded on 1 to 10 scale, final project is worth 30 more points.

ISP activity name	**8) 3D-printing prototypes for real world projects**
Instructor	Stanislav Ashmanov
Description	I want to teach Skoltech students how to use 3D-modelling software and 3D-printers to build prototypes for their projects. Rapid prototyping can be used in different ways (design prototyping, functional prototyping etc.), but it always brings "superconductivity" of ideas in any project. During my course, I want to show that 3D-printing is an easy and powerful instrument for every innovator.
Expected outcomes	Students will know how to create 3D-models for their present and future projects and print them using Skoltech printers.
Pre-requisites	None
Workload	15 hours

Learning activities	1. Short introduction in 3D-printing (history, possibilities and future) 2. Solidworks usage 3. 3D-printers usage 4. Visit to 3D-printing company

ISP activity name	**9) Days of Science: Astronomy and sky observations**
Instructor	Shteyngardt Veronika, Anton Pogrebnoi
Description	Astronomical observations of the night sky and the Sun (several ours/week). Practice with telescopes. Meteorology observations. Lectures about how the universe works (from 6 to 8). How to observe the sky. What is meteorology. How to make astrophoto. How to make astronomy and science popular (problems, event management solutions). 2 outside-events: excursion to the observatory, excursion to the Moscow Planetarium
Expected outcomes	Skoltech community of amatory astronomers, popularization of astronomy, Getting of the next skills: watching the sky, work with a telescope and a map of the night sky, making astrophoto.
Pre-requisites	None
Workload	20 hours
Assessment	Attendance, ping-pong test

ISP activity name	**10) Volleyball science**
Instructor	Daria Stepanova, professional coach (Artem Savin)
Description	Several volleyball trains that will give invaluable experience to begginers and professionals. In the end of cource there will be a volleyball match.
Expected outcomes	Volleyball game gives experience in team work, improves leadership skills. It is also good for health (even when spend a lot of time sitting near computer). This activity will bring a lot of fun)
Pre-requisites	None
Workload	10 hours
Learning activities	Volleyball playing skills: - volleyball feed - receiving the ball - pass - atack Leadership skills, in-game-communication skills

Assessment	Mandatory attendance, 3 tasks with balls (volleyball feed, receiving the ball, pass)

ISP activity name	**11) Documentary for fun**
Instructor	Dmitry Zubkov
Description	During this course students will watch and discuss documentary films devoted to outstanding events and fascinating topics. We will try to disprove the myth that all documentaries are boring. The range of films will be defined by future spectators.
Expected outcomes	Fun, some useful (or useless) knowledge, practice in discussions.
Pre-requisites	None
Workload	12
Learning activities	Watching documentaries.
Assessment	
Additional information	Course instructors will prepare a preliminary list of movies. This list is going to be supplemented by participants (you). You are expected to propose interesting documentaries, which you would like to watch or have already watched and are ready to recommend. Then by complex (but transparent ;)) voting we will choose the most desirable films. Within 2 hours of each meeting we are going to watch one full-length picture or two-three-more short films. Following discussions are encouraged, but everybody is free to escape.

ISP activity name	**12) The history of musical theater**
Instructor	Tatiana Svistova, Dmitry Zubkov
Description	This course is for students, who would like to find out more about musicals (especially, Broadway!) and everything around them. Every lecture will be devoted to a composer, or a famous performer, or a phenomenon of musical theater, etc. Two participation formats are suggested: each student may simply attend the lectures or prepare one-two of them.
Expected outcomes	Erudition in this specific area, chance to comprehend the charm and the power of Broadway.
Pre-requisites	None
Workload	15 + 5 additional for 1 prepared lecture
Learning activities	Listening to the music, reading of fiction and non-fiction literature, searching for interesting historical facts, preparing lectures (optional), participating in discussions during lessons.

Additional information	The course comprises 12 lectures (about 45 min each). You could prepare one-two lectures too (and get more hours for this course). There are a few examples of topics below. But you are free to tell about the topic interesting for you. If you tell about a person, it will be better if you include in your lecture something about biography, the most singificant works - and about the most impressive for you. People: Lloyd Webber Cole Porter Irving Berlin George Gershwin Oscar Hammerstain & Richard Rogers Stephen Sondheim Barbara Streisand Fred Astaire ...etc. Or phenomena: History of Broadway Modern Broadway musicals Disney musicals French/Canadian musicals Austrian/German musicals Russian musicals Film adaptations of musicals Original musical movies ...etc.

ISP activity name	**13) Poetic marathon**
Instructor	Dmitry Zubkov, Tatiana Svistova
Description	During poetic marathon you will have an opportunity to share your favorite poems and poets with others. There will be no stage – just the circle, where everyone will take turn to recite. Of course, you may also just come for listening. Presumably, there are going to be 1-3 meetings. Apparently, we will focus on Russian/English poetry, but other languages are also welcome.
Expected outcomes	Widening of reading, personal enrichment, practice in recitation, pure joy.
Pre-requisites	Love for poetry is necessary, taste in literature is expected.
Workload	6 hours

Additional information	Poetic marathon is quite specific action, so there are a few tips to get more pleasure from it. 1. The main rule: don't be shy! 2. We all have very different circles of reading. Amount of content is increasing threateningly and in this flood many great poets remain little-known. And even among works by famous authors there could be little-known masterpieces. The most interesting thing is to share something precious to you with everybody - so, we all will discover a lot of new. 3. There will be some kind of themes for every meeting. Themes are not obligative - the intention is to inspire you, to direct, to help to choose if you have too many worth poems to bring them all. If you would like to read anything beyond particular theme - you are definitely welcome! 4. It would be more convenient if you print all your lists in advance (or just before the meeting) because glowing screens of phones are distracting and not enough oldschool :) Hovewer, if you just remember some great poem, of course, you are free to look it up - it would be better than belated regrets. 5. Not very long poems would be better. It is preferred to have at most one poem longer than 3 min in your set list.

ISP activity name	**14) "Crash course" on programming interviews' preparation**
Instructor	Olga Korobova
Description	This course will be a preparation for programming interviews and will cover topics and problems on Linked Lists, Trees and Graphs, Arrays and Strings, Recursion, etc. It will consist of sessions with interactive practice problems and homework assignments. The goal is to refresh fundamentals of Computer Science and improve problem solving and coding skills for successful technical interviews. The course will be based on "Programming Interviews Exposed" and "Cracking the Coding Interview" books.
Expected outcomes	Improved coding and problem solving skills for programming interviews. Fun.
Pre-requisites	Computer Science background
Workload	50 hours
Learning activities	Refreshing fundamentals Discussing and solving practice problems that are often asked on interviews
Additional information	Pdf versions of "Programming Interviews Exposed" and "Cracking the Coding Interview" books are available online.

ISP activity name	**15) Introduction to Chess**

Instructor	Almir Dzhumaev
Description	Chess is a wonderful mix of sport, art, and science. If you want to learn how to play chess this class will help you. In the end of the course students will compete in a tournament with prizes.
Expected outcomes	The main expected outcome: each student will learn how to play chess.
Pre-requisites	None
Workload	40 hours
Learning activities	Lectures, games
Assessment	Tournament in the end of the course

ISP activity name	**16) Opportunities in the IT Entrepreneurship**
Instructor	Almir Dzhumaev
Description	This course will be valuable to anyone interested in founding or joining a startup company based around information technology. Through discussion of IT industry trends and potential application areas, students will develop an understanding of models for creating startups and critical success factors for new companies.
Expected outcomes	Skills building
Pre-requisites	Familiarity with IT products & services; understanding of business fundamentals
Workload	80 hours
Learning activities	Lectures, homework (reading and analysis of study materials), peer exchange, class discussions, essay
Assessment	Class participation - 50% Short paper - 50%

ISP activity name	**17) Get Up and Keep Snowboarding!**
Instructor	Maxim Zakharkin
Description	This is an activity for those who is eager to learn the basics of descending hills using a snowboard The class will take place on the KANT slope, m. Nagornaya. Skoltech will cover the expenses of renting a snowboard kit (snowboard+boots) on Saturday. Wednesday class is not sponsored. If you want to save some money, ask your friends, maybe they have a standing idle snowboard (boots can be rented separately)? :)

Expected outcomes	snowboard skills building + fun
Pre-requisites	Waterproof pants
Workload	Min 10 hours. If you take optional self-sponsored classes - 20 hours
Learning activities	Excercises from how to stand on snowboard to Sideslipping, Traversing, Falling Leafs, Garlands and finishing with linking turns.
Assessment	Ability to slid down the hill on a snowboard

ISP activity name	**18) Science and Cooking**
Instructor	Olga Popova
Description	In this class you'll learn about food, cooking and about science. Cooking is a good way to explain major scientific principles that are all around us. Each week we're going to watch amazing dishes created by world famous chefs and you are going to learn the underlying scientific principles. Each week we're going to have a lab where you'll explore the scientific principles that are specific for that week.
Expected outcomes	You will better understand the physics and chemistry of different processes and learn the underlying scientific principles of food cooking. Moreover, you will learn some new recepies and have a lot of fun!
Pre-requisites	Willingness to explore and understand the world around you
Workload	40 hours
Learning activities	Each meeting we'll be watching a video with amazing dishes created by world famous chefs (~30 min). Then we'll be learning the underlying scientific principles(~1 hour). After we'll have a lab where we'll try to implement the knowledge from the lesson(~1,5 hour). And finally student's will have to do the homework(~2 hours).
Assessment	There will be no assesment. Students could do a report on homework and/or share their recepies.

ISP activity name	**19) SELF SPONSORED Skiing in the Alps, Dates: 24/01/15 - 31/01/15**
Instructor	Alexander Vidiborskiy, Elena Shirokova

Description	The skiing workshop will be held in French part of the Alps (most probably Serre Chevalier). Each day will consist of at least three types of activities: skiing, team-building exercises, workshops and discussions on self-development techniques (time management, goal setting, presentations skills, etc.). Also, as continuation of the ISP-2014 we will conduct several experiments on the RF communications between several skiers in rough terrain. The activity is self-sponsored. The approximate budget: 1) Tickets (Mocow-Turin-Moscow) ~ 200 euro 2) Ski pass (6 days) ~ 210 euro 3) Housing - up to 200 euro 4) Transfer ~ 40 euro 5) Equipment rental (e.g. snowboard + shoes) ~ 90 euro 6) Food (self served) ~ 80 euro TOTAL ~ 820 euro.
Pre-requisites	None
Workload	40 hours

ISP activity name	**20) Poi workshop**
Instructor	Artem Naumov
Description	Short classes in poi spinning - performance art and physical activity for everybody! To get an idea what poi is, please refer to http://www.playpoi.com/what-is-poi In the class participants will learn basic movements during one week of intensive spinning, and then will be able to combine them in sequences and create individual or group performance. This class assumes making some equipment (yes, poi!) in masterskaya. We will make training poi and even glow poi using our natural ability to cut, solder and assemble.
Expected outcomes	Poi is an entertaining and addictive activity. It improves your coordination and trains your mind, exercising first left, and then right part of your brain. And then possibly both. British scientists long time ago proved that this will affect your work and study performance in a good way! After completing the workshop, you will be able to: - Better coordinate your movements - Improve your mind to handle creative tasks - Take a rest from your studies any time you need it - just start spinning and all your hate will go away! - Finally, amuse your friends and yourself with just 2 balls on ropes.

Pre-requisites	None
Workload	15 hours
Learning activities	The classes will be total practice. I will show the movements and then will assist those who struggling to learn them. The poi assembly will include cutting the tennis balls, fitting ropes/chains, attaching additional elements to improve the quality or appearence of the equipment. The glow poi assmbly will include cutting plastic bottles, soldering leds, attaching batteries and assembling all the stuff.

ISP activity name	**21) "Startup: Limits to growth" Simulation Game**
Instructor	Dmitry Katalevsky, MPA, Ph.D.
Description	The "Startup: Limits to growth" is a 3-4 hours simulation of a fast-growing startup, producing electronic gadgets. The game simulates a startup development dynamics during a period of 3-5 years. The task for players is to scale up the business as fast as possible (the teams of 3-4 participants compete against the computer model and themselves). Players will be required to make decisions about manufacturing management, hiring personnel and advertising policy. The simulation experiment provides an excellent opportunity to test and train participants' business planning and decision-making skills in a dynamically uncertain environment.
Expected outcomes	The simulator contributes to shaping of such skills as system analysis, strategic planning and decision-making within an environment of high uncertainty. It also includes nonlinear effects and feedback loops, which, if being ignored, decrease a chance of successful business scaling. The simulator can be of value not only to start-ups, but also to a wide range of specialists interested in management issues, to management and organizational development professionals (middle- and top-level managers). Fields of application are presented by, but not limited to: MBA / Executive MBA programs, strategic management, innovation management, microeconomics, organizational engineering.
Pre-requisites	None
Workload	4 hours
Learning activities	1) Introduction to simulation (20-25 min) 2) Business planning: a group work in teams on creating a quick business development strategy for the simulation (30min) 3) Group simulation (1-1.5 hours) 3) Debriefing: feedback, learning insights (20-30 min) 4) Lecture on premature scaling and start-ups failures (45 min - 1 hour, Dmitry Katalevsky)

Additional information	"Startup: Limits to Growth" is the part of the microworlds family such as Fish Banks, People Express, LoFare Simulator and other established simulations in management decision-making. This simulator is designed taking into account the best experience of simulation games developed by Kim Warren from London Business School and John Sterman from Sloan School of Management, which are currently being successfully used in MBA / Executive MBA programs for middle- and top-level managers. However, unlike existent analogs which are based on a system dynamics approach, the simulation "Startup: Limits to Growth" uses agent-based modelling. The flexibility and high forecasting potential of agent-based modelling combined together with the latest visualization opportunities available in AnyLogic software allow to reach a new level of modeling in creation of interactive simulators for business & management education.

ISP activity name	**22) Music Engineering: Signal Processing and the Frequency Domain**
Instructor	Brendan Smith, Artur Uzbekov, Bogdan Uzbekov
Description	Learn how to make music like a professional. Use science and engineering analytical skills to accelerate your learning curve. Short lectures on signal processing and time/frequency domains. Long lab sessions in the music studio. Every day you will record a song yourself, or participate in recording one of your peers. By the end of 1 week, the group will have finished a 10-20 track mix CD.
Expected outcomes	Very tight-knit cohort-building through collaborative risk-taking making a musical album together; Personal development and expansion of comfort zone through creative expression; Applied skills of how to connect musical equipment, amplify, and process signals; Understanding of signal processing and data acquisition system theory;
Pre-requisites	Musical aptitude or interest
Workload	30 hours

Learning activities	Lecture 1: Overview - Music production Lab 1: Collaboratively record a 4-track song in 1 specific genre Lecture 2: Signal processing and Fourier transforms Lab 2: In a different specific genre, collaboratively record a 4-track song Lecture 3: Frequency domain and data acquisition Lab 3: In a different specific genre, collaboratively record a 6-track song Lecture 4: Music production tricks: EQ and Audio compression Lab 4: In a different specific genre, collaboratively record an 8-track song Lecture 5: Q&A - wrap-up - quick Lab 5: Long session to clean up previous songs and record a final song in any desired genre
Assessment	Students will receive active critical feedback throughout from experienced musical producer with 30+ songs of experience working with 5+ different recording artists. In each lecture, the previous day's song will be analyzed and used as a teaching tool to improve the quality of the next day's composition. Final musical CD will be available for public listening and comment, the group will be assessed by their peers and will be motivated to create something of high quality.

ISP activity name	**23) Science in Contemporary Art**
Instructor	Stanislav Shpanin
Description	These sessions will provide contemporary art history classes tailored for scientists and engineers with a concentration on American contemporary art history, innovative ideas in the arts, and arts and sciences collaboration. Each session will be divided into a theoretical part and a practical studio time. The theoretical part of the activity will be spent on studying and discussing contemporary art history and artistic practices that involve art and science projects. Scientists will be provided with opportunities to share their ideas and foster their own creativity. Lab time for these sessions is designed to provide students with the opportunity to create artworks based on the knowledge received in the course and their own professional expertise.

Expected outcomes	Students will study global collaborations between specialists of the arts and sciences, and the engineering community to provide the exchange of ideas to stimulate innovative ideas in the science community and the creation of scientific and artistic projects. By the end of the course, students will have a basic knowledge of main themes in contemporary art and will be able to examine their scientific work from artistic and cultural perspectives.
Pre-requisites	no previous experience with art history or studio art is expected
Workload	40 hours
Learning activities	Schedule of Topics and Assignments Date - Topic - Lab Readings and Assignments 1/12 - Introduction to Art History - Self portrait project 1/13 - Mass Production: Gerhard Richter and Andy Warhol - Print project “Print project” and Rosenberg, Harold, American Auction Painters 1/14 - Physics: Alexander Calder and Chris Burden - Balance project “Balance project” and Kandinsky, Wassily, Concerning the Spiritual in Art: the Movement of the Triangle 1/15 - Natural Science: Mark Dion and Damien Hirst - Showcase project “Showcase project” and Greenberg, Clement, Avant-Garde and Kitsch 1/16 - Objects I: Marcel Duchamp and Jeff Koons - Manifesto project “Manifesto project” and Marinetti, Filippo, The Founding and Manifesto of Futurism

ISP activity name	**24) Mechanical engineering 101: mechanical assemblies, reverse engineering, engineering drawings and 3D modeling**
Instructor	Alexandra Gorkina
Description	During the lectures students learn how to understand and make engineering drawings, as well as how to do basic 3D modelling. They learn basics of mechanical assemblies, design for assembly (DFA), design for manufacturing (DFM). Project: students (in groups of three) buy a small assembled product costing no more than ~2000 RUB and having 10-20 parts. Examples of products: hand-held power tools (e.g. electric drill, staple gun), small home appliances (e.g. coffee machine, juicer), toys. They analyse it in detail technically and economically, as well as from the DFA and DFM points of view. They produce drawings of individual parts, a 3D model of the assembly and an exploded view. The students suggest ways to improve the product from the design, DFA and DFM points of view.
Expected outcomes	Students develop understanding of how parts are assembled and how complex assemblies are designed. They have fun taking apart a product. They learn how to use CAD software for making 2D drawings, as well as for making 3D models and assemblies.

Pre-requisites	None
Workload	45
Assessment	Homework: 1/5 of the final grade Project: 3/5 of the final grade Project presentation: 1/5 of the final grade

ISP activity name	**25) Pilot Crash Course: Learn how to fly a Cessna 172 (without crashing)**
Instructor	Alessandro Golkar
Description	In this short course we will introduce the basics of piloting looking at some of the fundamentals of general aviation. At the end of this course you will be able to successfully complete a standard pattern to take off and land a Cessna 172. We will apply the knowledge learnt in class flying a simulated Cessna 172 on MS Flight Simulator. Learning objectives: 1) To get acquainted with general aviation 2) To get excited about flying and get motivated to learn more about it 3) To learn how to use a computer-based flight simulator to train basic piloting skills On Day 1 (2 hrs) we will review aircraft general knowledge, and flight planning and performance. We will review the procedures requires to pre-check a small aircraft before flight. On Day 2 (2 hrs) we will review flight planning and performance, human performance & limitations, meteorology and navigation. We will apply this knowledge to complete and plan a flight mission and weight&check balance for a cross-country trip. On Day 3 (3 hrs) we will briefly review operational procedures and play MS Flight Simulator in teams to successfully conduct a standard flight pattern for takeoff and landing under a variety of simulated weather conditions.
Workload	20 hours
Learning activities	Learning objectives: 1) To get acquainted with general aviation 2) To get excited about flying and get motivated to learn more about it 3) To learn how to use a computer-based flight simulator to train basic piloting skills

ISP activity name	**26) Introduction to Maple**
Instructor	Andriy Zhugaevich

Description	1-week crash course on Maple program (www.maplesoft.com/products/maple): from basics to advanced use, from calculator to multi-user large-scale projects. Five 1.5 hour lectures: 1) introduction, 2) mathematics, 3) programming, 4) advanced use, 5) result-oriented programming, managing projects, overview. Five 1.5 hour recitations including practice, Q&A, case studies, individual work. Homeworks and projects.
Expected outcomes	Basic and advanced skills on using Maple, computing and programming skills.
Pre-requisites	Install student or evaluation version of Maple version 14 and above
Workload	30 hours
Learning activities	Five 3 hour classes (Monday through Friday) each including 1.5 hour lecture and 1.5 hour recitation including practice, Q&A, case studies, individual work. Optionally: students are encouraged to do small projects corresponding to their primary research activities.

ISP activity name	**27) Practical guide for LaTeX**
Instructor	Andriy Zhugayevych
Description	2-day lecture+practice+Q&A on LaTeX. 1st day: configuring TeX, basic skills on creating LaTeX documents. 2nd day: advanced use, practice, Q&A.
Expected outcomes	Configured TeX installation. Basic skills on LaTeX.
Pre-requisites	Download MiKTeX installer.
Workload	6 hours
Learning activities	Lecture, practice, Q&A, individual help.

ISP activity name	**28) Introduction to C++**
Instructor	Mikhail Matrosov
Description	C++ is an industry standard programming language. I'm going to teach you basics from the very beginning, no programming skills are required (though are welcome). The course consists of two parts: 1) Introduction to C; 2) Basic C++. The first half of the course is devoted to C language, which is a subset of C++. It will give you the ability to write simple programs. Note that Arduino and most of the microcontrollers are programmed in C, so I can teach you how it is done. The second part of the course is just to pave the way to an understanding of C++, that is way more powerful and flexible than C itself.
Expected outcomes	Basic programming in C/C++, Arduino programming
Pre-requisites	None
Workload	40 hours

Learning activities	Seminars, homeworks
Assessment	Participation in seminars, homework assessment

ISP activity name	**29) Building a robot**
Instructor	Morgan O'Brien, Rene Miller, Sam Darryanto
Description	The students will build a shoe boxed sized robot with sensors. These sensors will detect a route and the students have to program the robot to follow the route.
Expected outcomes	Skills building: basic programming, better understanding of how sensors work Fun :)
Pre-requisites	Coding experience helpful
Workload	36 hours
Learning activities	Lecture and hands on lab for the following topics: Circuits, resistance, computer science through Arduinos, sensors, robotics
Assessment	Demonstrated understanding of circuits, CS, sensors, robots through successful implementation of line following robot

ISP activity name	**30) Swimming pool**
Instructor	Menshchikov Alexander
Description	All the group is divided into two groups: 1. These who want to learn swimming 2. Others, who just want to swim
Expected outcomes	Probably we will figure out, that we can create student swimming sports department, or just some of students, who cannot swim now will develop this skill.
Pre-requisites	None
Workload	6 hours
Learning activities	1. Brace 2. Back strokes 3. Crawl strokes 4. Butterfly strokes

ISP activity name	**31) Lingustics through Problem Solving**
Instructor	Vitaly Pavlenko

Description	Linguistic problems are the most awesome way to dive into the differences between languages. We're going to solve some problems on: - writing systems - phonetics - morphology/syntax - language history You'll be exposed to scripts and sentences of the languages you've never seen before. Yet you'll be able to quickly grasp some structural facts and get a lot of pleasure while also improving your linguistic background.
Expected outcomes	Students will get experience of solving linguistic problems. Students will get some linguistic notions that can summarize what they get after solving the problems.
Workload	4 hours
Learning activities	Individual problem solving Group problem solving Discussions

ISP activity name	**32) Neurophysiology and personal effectiveness**
Instructor	Tatiana Smirnova
Description	Quite often time-management, goal setting and other personal effectiveness techniques do not produce any result because our brain operates in a different way. I'll try to provide an overview of what neurophysiology tells us on how we should use our main organ, how you can apply that knowledge on a daily basis and how to fool your brain in order not to let it to fool you.
Expected outcomes	Upon completion of this course a listener will be able to: 1. Operate with state-of-the art knowledge in neurophysiology and its applications to personal effectiveness 2. Apply key concepts and skills of personal effectiveness in a neuroscience-based way 3. Understand that sometimes our brain fools us and how we can fool it.
Pre-requisites	None
Workload	5 hours
Learning activities	1. Interactive presentation about advantages of neuroscience and how they help in personal effectiveness 2. Behavioral demonstrations of typical cognitive mistakes 3. Checklists use and other materials use (optional) to practice skills discussed
Assessment	Feedback on the content and future course development is required.

ISP activity name	**33) Yoga. Asana, Pranayama and Meditation**

Instructor	Aleksandra Akhmadullina
Description	2-hour-long hatha yoga accompanied by pranayama (breathing techniques) and meditation
Expected outcomes	Starting from the first class participants will develop flexibility and strength, learn how to listen to their bodies, get rid of anxiety and stress, and gain peaceful mind and vibrant body.
Pre-requisites	No prerequisites
Workload	30 hours
Learning activities	Learning Asana, Pranayama, Meditation
Assessment	Assessment will be made by the end of the course according to the ability to perform physical exercises and breathing techniques, practice meditation and relax.
Additional information	If you decide to participate and want to have significant results, it is important to practice every day, in those days when we do not have in class practice, I expect everyone to have at least one hour at home.