Welcome students. This session deals with the course mineralogy at fifth semester in the subject of geology for the third year students. Now the syllabus which will be covered in this will involve unit 1 and the name of the module is description of mineral groups pyroxene 2. I am Meghana Devli assistant professor, Department of Geology from Parvatibai Chowgule College.Now in this session we will basically deal with the physical properties, optical properties and the paragenesis of the pyroxene group of minerals. At the end of this session the student will be able to correlate physical and optical properties of the pyroxene group of minerals and understand how minerals originate and associate with each other within a rock; that is basically the paragenesis. Now the first thing comes is the physical properties. Now since the pyroxenes are chain inosilicates and they are aligned all parallel to the c-axis the basic habit of all pyroxenes will be prismatic. so they will grow elongated to the crystallographic c-axis. also owing to the crystal structure which are inosilicate single chain and they are aligned parallel to each other and because of that there could be some bonds which are weaker and as a result of that they possess two sets of cleavages which are not exactly meeting at 90 degrees but slightly differing from 90 or 90 degrees. The variation in the density or specific gravity of pyroxenes is directly related to its chemical composition. Obviously the more iron in it, the heavier will be the mineral. when it comes to optical properties pyroxenes, as we know crystallize in the orthorhombic system as well as in the monoclinic system and as a result of that they can show straight extinction or oblique extinction. orthopyroxenes will show straight extinction whereas monoclinic can show you straight as well as oblique Extinction. This is basically because of the relation of the behavior of light and the crystallographic axis within the crystal. the orthopyroxenes right from bronzite to ferrosilite they usually pleochroic, that means they can be showing you more than one two colors within a petrological microscope whereas the clinopyroxes which are augites they will be non pleochroic and they could be showing you also just one set of or one color. so pleochroism means more than one color. So if it shows you one color it is non pleochroic but if it shows you more than one color then it is pleochroic. like for example hypersthene which is an orthopyroxene, it can show you two shades of color within a petrological microscope that is pink and Green whereas on the other hand if you take a section of pyroxene like augite, it is colored but will show you green color therefore it is non-pleochroic whereas hypersthene is pleochroic.When it comes to the paragenesis of pyroxenes, the orthopyroxenes occur in basic and ultrabasic rocks which are very low in calcium. so calcium is not a dominating element within the crystal structure and these rocks are usually pyroxenoids. Which are essentially predominating with only pyroxenes then you have the peridotite, the picrites and the norites wherein these are associated with magnesium, olivine magnesium or magnesium spinel. if you just see all these rocks you will have all of those which are basically magnesium rich. magnesium rich essentially means they are very high temperature plutonic condition rocks. Now some of these rocks could be hundred percent orthopyroxene like for example if it consists only of bronzite then it is called bronzitite. if it's only hypersthene then they're called hyperstenites. A variety of a granitic rock which contains hypersthene, that's an orthopyroxene is what we call charnockite. This charnockite name essentially has come from the petrologist Job Charnockite who has worked essentially on the charnockites of southern india. now the orthopyroxenes are typical of the Granulite Facies of metamorphism. The members of the diopside Hedenbergite series occur in a variety of metamorphic rocks. and more Mg rich varieties are characteristic of thermally metamorphosed calcic rich sediments. Hedenbergite occurs in thermally increasingly metamorphosed iron-rich sediments. diopside occurs in picrites and basalts whereas salite is a pyroxene in hypabyssal rocks derived from alkaline basalt magmas. The members of the augite ferro augite and sub calcic augite series are found in a variety of igneous rocks like for example gabbros, dolorites and basalts. As in the case of feldspars, pyroxenes are also one of the essential minerals which are associated with all these three rocks. so the basic chemical composition mineralogical composition of gabbro dolerite and basalts is clinopyroxene and plagioclase feldspar but

the grain size in case of gabbro will be larger as compared to those of basalts. so mineralogically all the three have clinopyroxenes and calcic plagioclase whereas the grain size will keep on decreasing from gabbro to dolerite to basalt suggests a high temperature rocks, the intermediate rocks whereas the basalts are extrusive rocks and which are called volcanic rocks. The pigeonite is also a pyroxene that occurs in rapidly chilled rocks, particularly basalts and and dolerites. Most igneous rocks which have undergone slow cooling pigeonite are inverted to orthopyroxene. it's also reported from some meteorites.the syenites and nepheline syenites these are basically have soda bearing pyroxenes like agerine and agerine augites.A high pressure rock contains omphacite Na bearing pyroxene and pyrope garnet and formed at very high pressures. Now these are exposed today if you just see some of the rocks like in the himalayas you see them associated with the himalayan rocks. but please know that these are high pressure rocks that means obviously they have come from the greater depth of the earth's crust or and today they are exposed on the continent. so eclogites are high pressure rocks. Now for this lecture the references are deer howie zuzuman: an introduction to rock forming minerals and Dana's textbook of mineralogy that is crystallography and physical mineralogy. thank you students.